Chemical Age

F.A.O. WORLD FERTILISER REVIEW
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VOL. 81 No. 2072

28 March 1959

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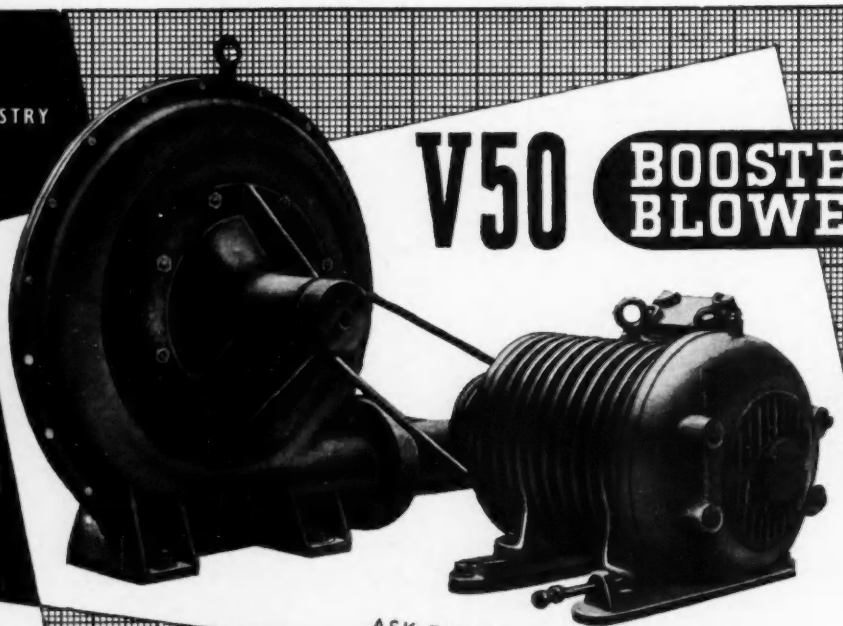

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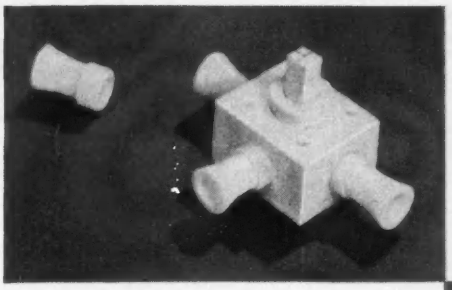

The Watson-Marlow 'Omega' Valve will handle most corrosive fluids under high pressures and full vacuum. It is made by The Watson-Marlow Air Pump Co., Marlow, Bucks, in 'Fluon' p.t.f.e. throughout to prevent chemical attack and grease contamination in their Vessel Pump.

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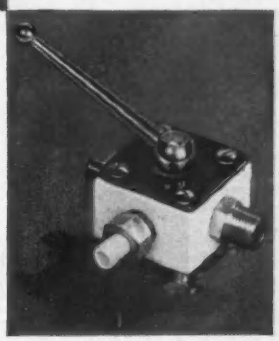

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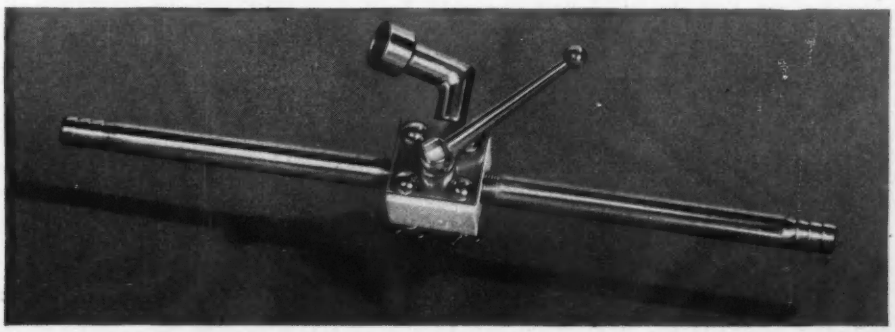
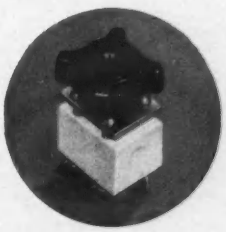
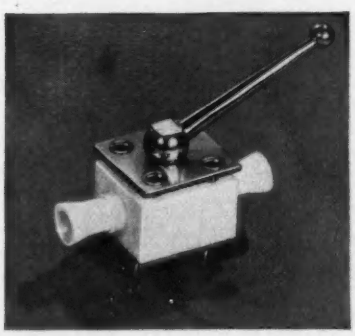
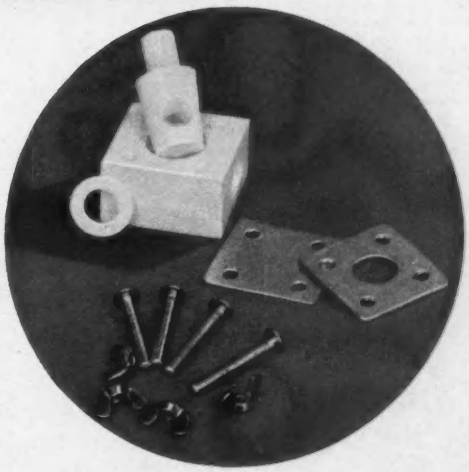






British and foreign patents pending covering the design and construction of the 'Omega' all 'Fluon' valve.



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13 June 1959

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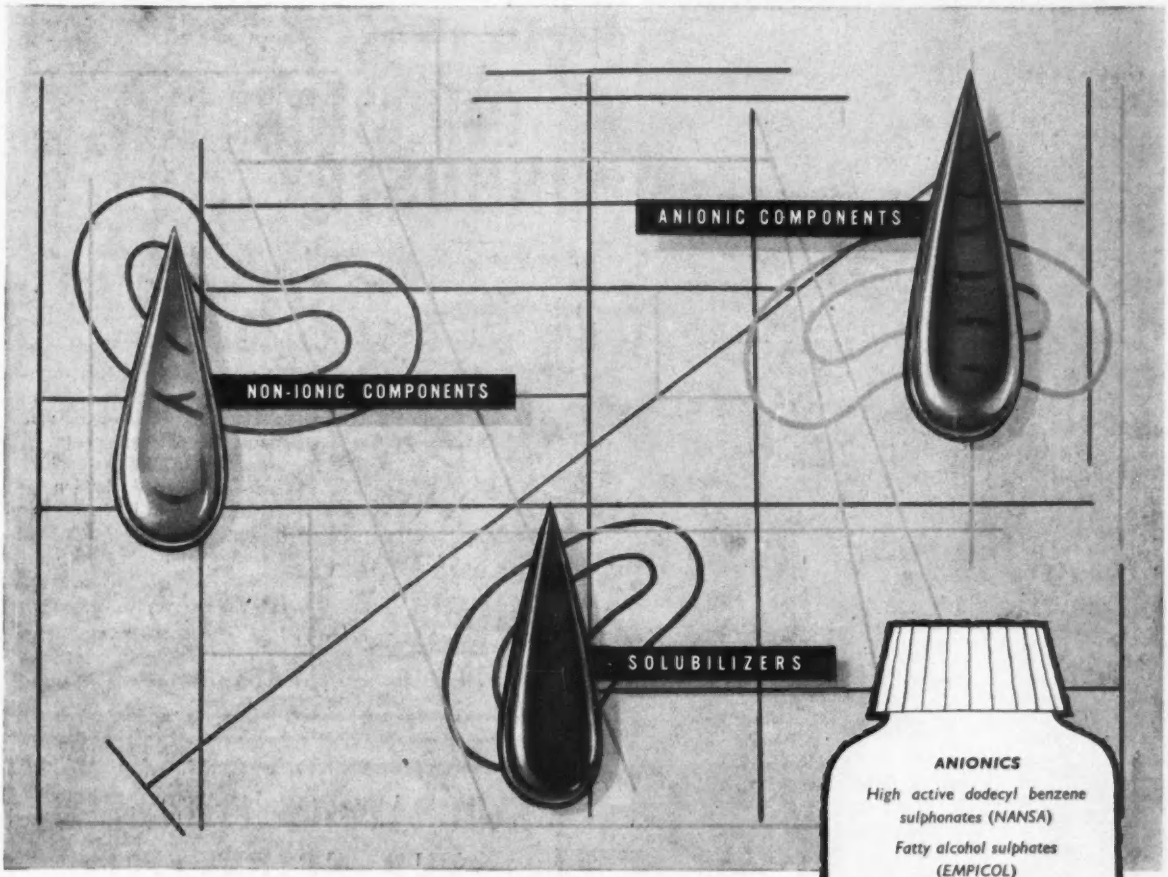

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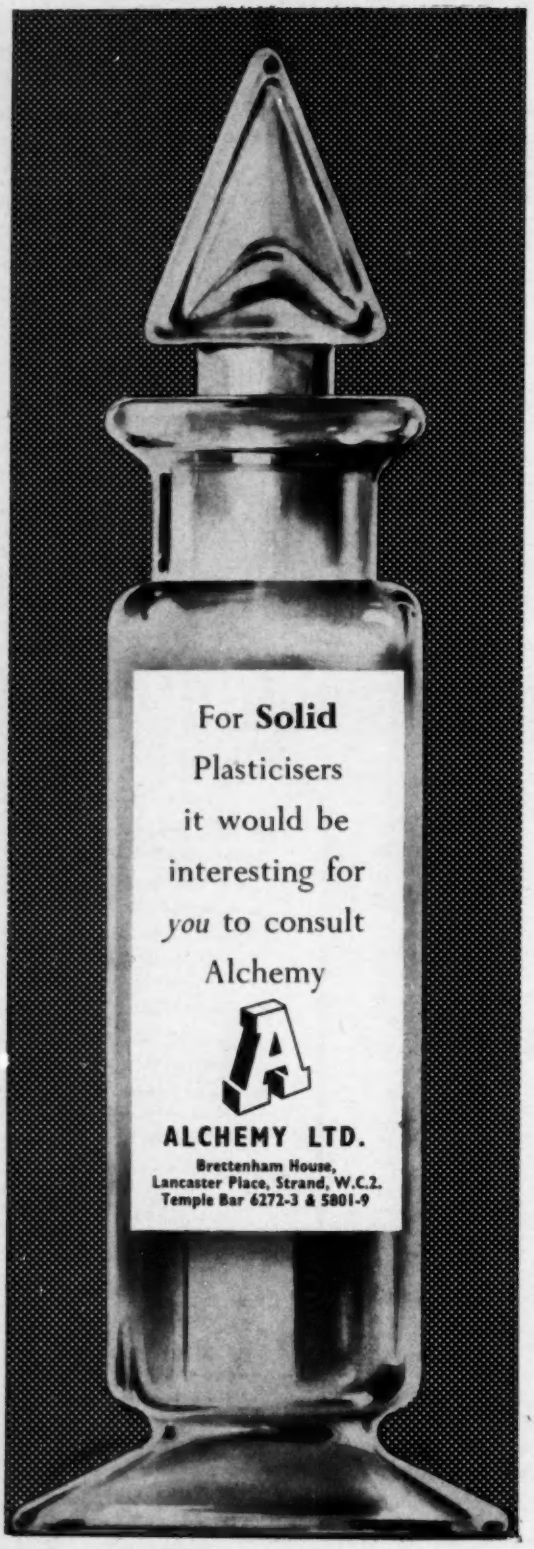

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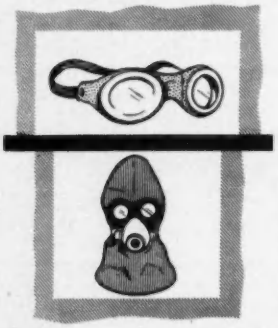

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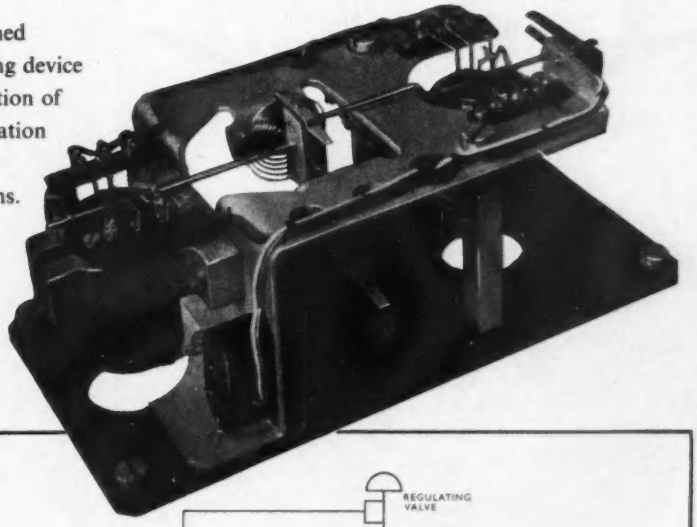

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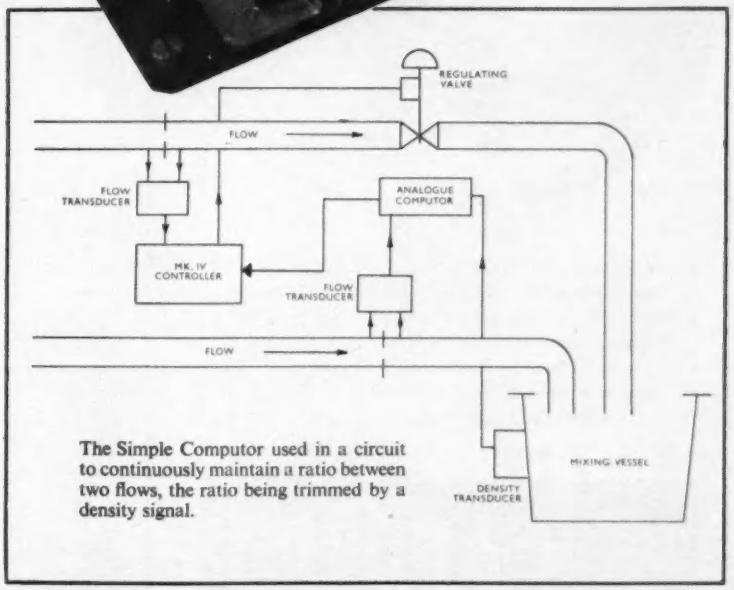

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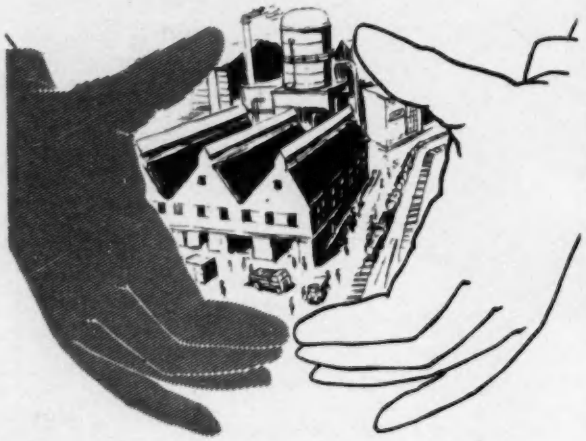

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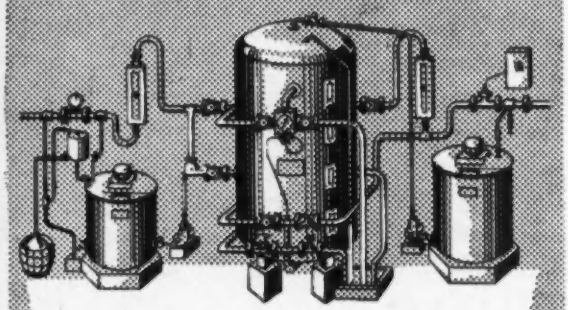

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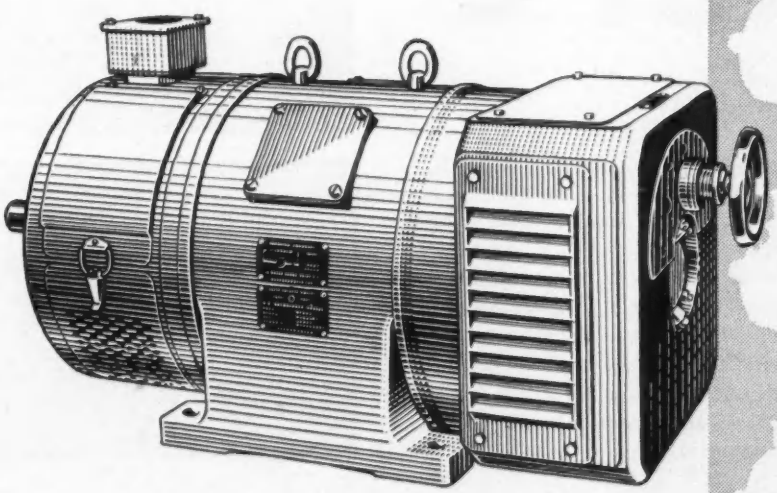

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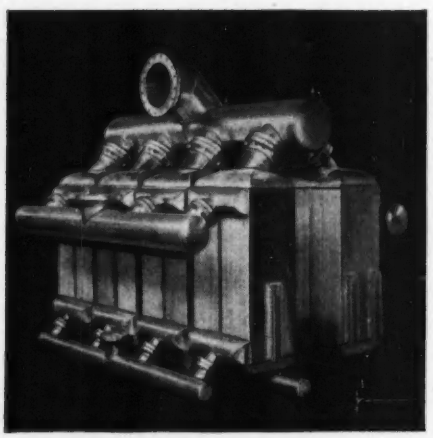

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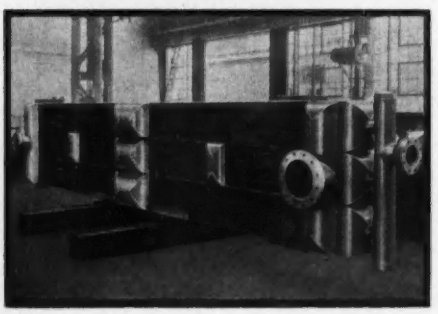

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VOL. 81 No. 2072
MARCH 28 1959

Telephone: FLEet Street 3212 (26 lines)
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CHEMICAL AGE

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SCOPE FOR EDTA

CONSIDERABLE activity in the chelate field in the U.S. was reported in CHEMICAL AGE in November last (22 November, p. 848). At that time the current outlet for chelating chemicals was put at 11 million lb. Recently Andrew J. Gard, Dow Chemical Co., told the New York Section of the American Chemical Society (*Chem. and Engng. News*, 1959, **37**, No. 4, 36) that most interest had centred on ethylenediamine tetraacetic acid (EDTA). He suggested that with the price of EDTA nearing 30 cents, plus a more competitive position with respect to more commonly used chemicals, the chelate market could reach 20 million lb. in 1960. With exploitation of this chelate in heavy-duty detergents and metal surface treatment, a market of 50 million lb. a year is visualised.

Sales of EDTA in the U.S. received a substantial boost following the finding that iron chelate cured iron deficiency in Florida citrus and its usage in cold rubber processing. Price reductions have also helped the chelate to become competitive with other chemicals. After its initial success in Florida, however, the product EDTA has not developed as expected. Two reasons are advanced for this: there are relatively few types of soil in which the chelate is effective, and, where it is effective, its effectiveness persists over a long period, thus greatly reducing the need for subsequent treatment.

The latest U.S. view is that EDTA is likely to find a really active outlet in scale prevention and removal in heat-exchange equipment, for it has been reported that the material is able to dissolve all types of deposits, with the exception of certain complex siliceous or sulphide compounds. Metal cleaning and surface treatment of metals, U.S. manufacturers consider, are another field where EDTA is expanding. A U.S. market of 5 to 10 million lb. of the tetrasodium salt has been suggested possible.

In industrial cleaners, there is scope for EDTA, for it has been found that detergent disinfectant-type cleaners based on chlorinated phenol derivatives give their best performance with soap; EDTA enhances the performance of these in hard water. The synthetic household detergent manufacturers in the U.S., however, have not taken up EDTA, as more than softening of hard water is wanted. The Dow Chemical Co.s Mr. Gard considers that the heavy-duty detergents and after-rinse treatment phases are best performed by EDTA. Development of this application would take up a great deal of pure tetrasodium or acid form EDTA. The limitation here is price.

This is the U.S. view, but what of the British one. The past decade has seen the industrial versatility of EDTA realised and exploited from its early beginnings as a simple textile auxiliary. More than one chemical manufacturer, it is believed, has been hypnotised by this diversification of uses into the belief that EDTA is an organic chemical which would repay manufacture on a very large scale. CHEMICAL AGE has therefore approached British manufacturers of the product and asked their views. There is in general a somewhat euphoric attitude; perhaps the result of inadequate market research which has undoubtedly led in Great Britain to over production, undue multiplicity of manufacturers and importers, build-up of stocks and price-cutting to a level quite uneconomic at the present total production rate. It has been stated recently that domestic production capacity in

Britain (apart from imports) is between two and three times the current consumption. This position is therefore similar to that which has occurred in the U.S. (CHEMICAL WEEK, 2 November, 1958) over the past year when the price has fallen by 20%. On the other hand at least one US. manufacturer has intimated that they go in for EDTA in a big way. (CHEMICAL AGE, 22 November, 1958, p. 848.)

This position the leading British EDTA manufacturers consider, has developed as a result of basing on the number of different applications false assumptions as to the quantities used. In most applications, EDTA is used as a very low-percentage additive, and a ton of it goes a very long way. For example, a cathode-ray tube manufacturer on one occasion ran an entire production line for six weeks on eight ounces of EDTA as a copper scavenger.

Prices in the U.K. are in line with those of the U.S., the tetra sodium salt selling for 4s 6d per lb. or less. The price of the liquid product could be below this. Pure EDTA sells at 20s per lb.

There are possibilities (but not, it is thought, probable) that by the use of the cheapest method of manufacture, employing free hydrocyanic acid and formaldehyde as carboxymethylating agent for ethylene diamine, EDTA could be made on the large scale at a cost at which it could compete with inorganic sequestrants in bulk uses such as water softening. This market, however, is diminishing rapidly as a result of the increasing effectiveness and use of deionising techniques.

The advent of bulk uses of EDTA in other fields (for example, electroplating) must await, it is felt, fresh technical developments, of which up to now there is no particular sign. This applies also to the uses of some of the chemical analogues of EDTA, such as hydroxyethylethylene diamine tri-acetic acid, which have from time to time been promoted as being better than EDTA in certain specific uses. To date, none of these can be said to have established itself on any substantial scale of use. On the laboratory use of EDTA, i.e. for analytical purposes only, it is reported to CHEMICAL AGE that sales have increased and that derivatives of the chelate are "popular at the moment". Export sales of EDTA are also stated to be good.

(CHEMICAL AGE is grateful to Hopkin and Williams, F. W. Berk, Whiffen and Sons, and in particuar to the Geigy Co. Ltd. for their placing the information on EDTA contained in this article at its disposal.)

ENZYME ACTIVITY TEST

ORTHOTOLIDINE and urea peroxide are key chemicals in a simple new test for enzyme activity developed by scientists of the U.S. Department of Agriculture to help food packers save time and money in quality control of frozen vegetables.

Blanching is an essential step in preparing most vegetables for freezing. It consists of a brief treatment in either hot water or steam to inactivate enzymes. This treatment is necessary to prevent loss of colour, flavour, and nutritive value in the processed products.

The new test, devised by Herman J. Morris of the Department's Western Utilisation Research and Development Division, Albany, California, is accurate and easy to use routinely in food-processing operations, and eliminates time-consuming analyses previously required.

To make the test, discs of standard laboratory filter paper are first soaked for 30 to 60 seconds in an alcohol solution of the two chemicals. After the treated discs are thoroughly dry, samples of the vegetables to be tested are pressed against them. The time it takes for the paper to turn blue is noted. If this colour change requires a minute or longer, the vegetable was blanched properly and is ready to freeze. But if the blue colour appears in less than a minute, it means that blanching was not sufficient to prevent enzymes in the vegetable from eventually causing undesirable changes in flavour, colour, and nutritive value.

U.S. FERTILISER CONSUMPTION

PRELIMINARY figures on U.S. fertiliser consumption for the year ended 30 June 1958 (Fertiliser Investigations Research Branch U.S. Department of Agriculture, *Agric., Chemicals*, 1959, **14**, No. 2, 34) show that there was a small drop in tonnage from the previous year (22,358,000 tons, a decrease of 351,000 tons or 1.5%). The figure for the fertiliser year is just about what the bulk figure was for the year ended 30 June 1952, when the tonnage was 22,432,000. There has been, however, a very great difference in the amount of plant food involved for whereas in 1952 the total of all plant nutrients applied was 5,203,000 tons the amount for 1958 was 6,465,000 tons. This is almost a 25% increase over the six-year period concerned. Particularly noticeable is that in the year to June 1958, for the first time the weight average of primary plant nutrients in mixed fertilisers moved above the 30% (30.26%) level—a new record.

Consumption of mixed fertilisers amounted to 14,252,000 tons—a decrease of 451,000 tons (3.1%)—and of materials for direct application to 8,106,000 tons—an increase of 100,00 tons (1.2%). Included in the materials are 7,155,000 tons of products containing one or more of the primary plant nutrients (N, available P_2O_5, K_2O), 940,000 tons of secondary and trace nutrient materials, and 11,000 tons not classified. The use of materials containing primary nutrients increased 92,000 tons (1.3%) and secondary and trace nutrient materials decreased 3,000 (0.3%).

Chemical nitrogen products, it is interesting to learn, were the only class of materials that showed an increase in 1957-58. Use of anhydrous ammonia increased 124,000 tons, nitrogen solutions 71,000 tons and ammonium sulphate 57,000 tons.

Consumption of all phosphate materials decreased by 5,000 tons, but the use of ammonia phosphate and phosphate rock including colloidal phosphate, increased by 74,000 and 11,000 tons respectively. The use of basic slag and normal and concentrated superphosphates decreased 8,000, 81,000 and 5,000 tons respectively. Consumption of potash materials decreased by 26,000 tons.

The total quantity of primary nutrients contained in all fertilisers, at 6,465,000 tons, was 88,000 tons or 1.4% more than in 1956-57. Of this total 2,264,000 tons were nitrogen, 2,280,000 tons of available P_2O_5 and 1,921,000 tons of K_2O. These quantities represent an increase of 129,000 tons (6%) for nitrogen and decreases of 24,000 tons (1%) for available P_2O_5 and 17,000 tons (0.9%) for K_2O.

Although the total quantity of fertilisers containing primary nutrients was 359,000 tons below consumption in the previous year, this lower tonnage contained 88,000 tons more primary nutrients than the large tonnage in 1956-57 and was due to the greater usage of chemical nitrogen. Total consumption of primary nutrients contained in mixed fertilisers amounted to 4,313,000 tons, comprising 848,000 tons of nitrogen, 1,789,000 tons of phosphate (as P_2O_5) and 1,676,000 tons of K_2O. These amounts represent 4,000 tons (0.5%) more nitrogen, 28,000 tons (1.5%) less of available P_2O_5 and 6,000 tons (0.4%) less of K_2O. For direct application materials contained 1,416,000 tons of nitrogen, 491,000 tons of available P_2O_5 and 245,000 tons of K_2O representing increases of 125,000 tons (9.7%) for nitrogen, 4,000 tons (0.8%) for available P_2O_5, and a decrease of 11,000 tons (4.3%) for K_2O.

The weighted average of the primary nutrients contained in mixed fertilisers was for nitrogen 5.95% (5.74%); for available P_2O_5 12.55% (12.36%); for K_2O 11.75% (11.44%) (i.e. a total of 30.26%). The proportionate increase was highest for nitrogen and lowest for P_2O_5.

F.A.O.'s World Review of Fertilisers

Consumption of N, P and K will Rise at Faster Rate in 1959

IN the fertiliser field the noticeable trends are for supplies of nitrogen, phosphoric acid and potash all to increase at an accelerating rate. While consumption of nitrogen continues at a fairly constant high rate, rates of increase in phosphoric acid and phosphate consumption, although higher in 1957 than in 1956, showed signs of falling off in 1958.

These findings are reported by the Food and Agriculture Organisation of United Nations in their 'Annual Review of World Production and Consumption of Fertilisers, 1958'. The report also states that so far as trends in the kinds of fertilisers are concerned, the tendency seems to be for a larger proportion of nitrogen and phosphoric acid supplies to be in the form of complex fertilisers at the expense of ammonium sulphate and ordinary superphosphate.

Total world production of fertilisers, in terms of N, P_2O_5 and K_2O from 1956 to 1958 are shown in Table 1.

Although the increase in total production of all fertilisers in 1957 over 1956 (8%) was more than in the previous year, the estimated increase in 1958 (3%) is much smaller. The increase in nitrogen production in 1957 (8%) was slightly higher than in 1956, and the estimated increase for 1958 is still higher. Phosphoric acid and potash production in 1957, both increased more than in 1956, potash by nearly three times as much, but in 1958 the estimates of production of both types of fertiliser are practically unchanged from 1957. In estimates of production in 1958, nitrogen has overtaken phosphoric acid and potash has markedly fallen behind. If allowance for ground rock phosphate, for direct application or for use as such in mixed fertilisers, is made in the estimates, phosphoric acid is still found to be slightly ahead (4%) of nitrogen production.

Rate of increase in nitrogen production in Europe is noted as being higher in the 1958 estimates (13%) than it was in 1957 (9%). Production in North America, to which the U.S. contributes over 90% of the total, continued in 1957 and 1958 to show a decline in the rate of increase, but a recovery, to a 10% increase, is forecast for 1959.

Processed phosphoric acid production. In 1957, when production in Europe (3.783 million tonnes) and North America (2.349 million tonnes) represented together over 80% (respectively 51% and 31%) of the world total. Europe showed a marked increase (13%) over the previous year, but the levelling off of production in North America, noted in recent years, continued. European production remained practically the same in 1958 as the previous year.

Potash fertilisers. European and North American production of potash fertilisers in 1957 were, respectively, nearly 72% and nearly 28% of the world total. Both continents showed a marked increase in 1957 over the 1956 figure, but in the estimates for 1958 no further increase is shown for Europe and an appreciable fall is indicated for North America.

Types of nitrogen fertilisers. Production figures for the principal nitrogen fertilisers are given in Table 2. Main changes are in the fall in ammonium sulphate and of solutions and the rise in 'other forms solids' of which complex fertilisers form a large part.

Ammonium phosphate is a main constituent of most complex fertilisers and the reported production of other complex fertilisers in 1957 (in terms of nitrogen content) is 342,000 tonnes, against a reported production (on the same basis) of 153,000 tonnes of N as ammonium phosphate. The total amount of ammonium phosphate actually produced is therefore much higher than the last mentioned figure. The most striking feature noted in the current situation regarding kinds of nitrogen fertilisers is the development in production and use of urea.

Urea for fertiliser use. Production of urea for fertiliser use in the various countries in 1957 and 1958 is shown in Table 3. Evidence of the increasing interest in urea as a fertiliser and of expected increase in demand is indicated by reports of projected new plants for urea manufacture or extension of existing ones. Announced capacities, in thousands of tons of nitrogen are Austria 6, Belgium 23, Netherlands 31, Pakistan 77, Japan 184, Taiwan 39 and Union of South Africa 51. The potential increase in production of urea in the next few years is therefore likely to more than double the total reported world production in 1958.

Types of phosphate fertilisers. Production of the chief types of phosphate fertiliser are detailed in Table 4. The F.A.O. report notes that 'single' superphosphate has shown a slow decline with a corresponding rise in 'other phosphates', a major part of which consists of the complex fertilisers already mentioned (with regard to N content). Ammonium phosphate is the main phosphorus carrier in most complex fertilisers

Types of potash fertilisers. Data are not available for the amounts of the different kinds of potash fertilisers produced by France and Eastern Germany (whose total production in 1957 was about 20% and an estimated 25% respectively of the total world production of K_2O). Figures are included, however, for the other three largest producing countries, namely, the U.S., West Germany and Spain (see Table 5).

World fertiliser consumption. World consumption with annual percentage changes are given in Table 6. The percentage increase of 11% for actual consumption of all fertilisers together in 1957 was nearly three times as much as the estimated increase (4%). The esti-

TABLE 1
World Production N, P_2O_5 and K_2O, 1956-58

Fertiliser	Production ('000's metric tons) 1956	1957	1958	% Increase 1956-57	1957-58
All fertilisers ($N+P_2O_5+K_2O$)	20,179	21,879	22,530	8	3
Nitrogen (N)	6,690	7,246	7,910	8	9
Phosphoric acid (P_2O_5)	7,147	7,578	7,668	6	1
Potash (K_2O)	6,342	7,055	6,952	11	−1

TABLE 2
Forms of Nitrogen Produced in each Continent, 1957 and 1958
('000's metric tons)

Fertiliser	Year	Europe	N. America	S. America	Asia	Africa	Oceania	Total
Ammonium sulphate	1957	1,019	418	1	584	7	23	2,050
	1958	1,099	391	1	644	10	24	2,169
Ammonium nitrate	1957	1,307	453	—	7	5	—	1,772
	1958	1,529	482	—	11	6	—	2,028
Calcium nitrate	1957	336	—	—	—	31	—	368
	1958	336	—	—	—	31	—	368
Sodium nitrate	1957	6	—	240	—	—	—	246
	1958	5	—	240	—	—	—	245
Cyanamide	1957	164	30	—	103	—	—	297
	1958	168	30	—	110	—	—	308
'Other forms': Solutions	1957	—	1,084	—	—	—	—	1,084
	1958	—	1,165	—	2	—	—	1,167
Organic materials (and guano)	1957	—	27	51	—	—	2	80
	1958	—	27	35	—	—	2	64
Other solids	1957	443	134	16	185	1	—	922
	1958	554	136	16	250	1	—	1,088

TABLE 3
Forms of Potash Produced in 1957 and 1958. ('000's metric tons)

Fertiliser	Year	W. Germany	Spain	U.S.
Pot. sulphate, 48-52% K_2O	1957	134	15	127*
	1958	118	15	104*
Pot. chloride:				
Exceeding 45% K_2O	1958	801	247	1,798
	1958	809	250	1,675
20-45% K_2O ...	1957	597	—	—
	1958	600	—	—
Crude potash salts up to 20% K_2O ...	1957	75	—	—
	1958	68	—	—
Other potash fertilisers	1957	71*	—	18†
	1958	70*	—	18†

* Includes sulphate of potash-magnesia.
† Includes various by-products, KNO_3; organics and crude potash salts.

mated increase in 1958 is much less (3%), but the forecast for 1959 indicates a somewhat higher rate of increase again (5%). The rate of increase in world consumption shows no sign of falling off, the F.A.O. report notes.

Consumption of nitrogen. The percentages of the world total of nitrogen consumed in Europe, North and Central America, and Asia in 1957 were, respectively, 45, 32 and 17, leaving only 6% for the other three continents. The levelling off expected in North America has not occurred and the rates of increase in the years 1957 and 1958 (and in the 1959 forecast) are as high or slightly higher for that continent as for Europe, which continues to show no signs of a falling off.

Data presented in this 1958 report show that the greatly accelerated rate of increase for Asia recorded in the 1957 review has not been fully maintained.

Consumption of phosphate. Europe and North America use, respectively, about 50% and 30% of the total world consumption, but while the levelling out of North American consumption is now confirmed, European consumption is noted as continuing to increase steadily. Asia again shows an exceptionally high and well sustained rate of increase in consumption, although the total tonnage is still relatively small.

With regard to the consumption of ground rock phosphate, North America and Europe consume about 50% and 30% respectively of the world total, but the level of world consumption, F.A.O. reports, is about 10% lower than that reported in their 1957 review.

Consumption of potash. As in the case of phosphate fertilisers, North American consumption of potash in 1957 and 1958 ceased to increase, but forecasts for 1959 predict a marked rise. European consumption is noted as continuing to increase. Europe and North America consume, respectively, over 60% and nearly 30% of the world total. Of the remainder, Asia's consumption is about three-quarters.

Highlights from the F.A.O. Report

- **Increases in world production and consumption of fertilisers, taken as a whole, will be continued during the period 1956-59.**
- **Total world production of fertilisers (excluding ground rock phosphate) in thousands of metric tons of nitrogen (N), phosphoric acid (P_2O_5) and potash (K_2O) in 1957 was 21,879, an increase of 8% over 1956.**
- **Total world consumption of fertilisers (excluding ground rock phosphate) in 1957 was 21,476,000 metric tons or 11% greater than in 1956.**
- **Estimates for 1958 indicate further increases of 3% in both world production and consumption.**
- **Conservative forecasts for 1959 indicate a tendency for the rate of increase in consumption to accelerate.**

Europe. Total production of all fertilisers increased by 15% in the two years 1956-58. For nitrogen the rate of increase in the second year (13%) was higher (9% in previous year), but for both phosphoric acid and potash the increase occurred wholly (for P_2O_5) or entirely (for K_2O) in the first year (13 and 10% respectively) with a further increase of only 1% for P_2O_5, and no change for K_2O in the second year.

The largest increase in nitrogen production over the two years occurred in West Germany (308,000 tons). Other countries with increases of 10,000 metric tons or more were:

France	88,000	Norway	39,000
Italy	82,000	Belgium	34,000
Netherlands	79,000	Austria	29,000
Poland	43,000	Spain	10,000
U.K.	41,000	Sweden	10,000

West Germany also showed the largest increase in phosphoric acid for the same period, 124,000 tonnes. Countries with increases of over 10,000 tonnes from 1956 to 1958 were:

Poland	26,000	Norway	16,000
Spain	23,000	Finland	12,000
France	22,000	Greece	12,000
Netherlands	21,000	Portugal	11,000

In Italy there was a fall of 34,000 tonnes, and in the remaining countries production remained practically unchanged.

Potash production in Spain increased in the two years by 202,000 tonnes and 15,000 tonnes, but little or no change has been reported by the other European potash-producing countries.

There are indications, F.A.O. states, of a slow fall in the usage of ammonium sulphate, sodium and calcium nitrates and calcium cyanamide, a slow rise in the usage of ammonium nitrate and a more marked rise in that of complex fertilisers. West European countries used ammonium nitrate with the exception of Italy, Portugal, Spain and the U.K., where more use is made of ammonium sulphate. In Denmark, Norway and Sweden, calcium nitrate is the major source of nitrogen used in straight fertilisers. Only in West Germany and Italy is more than 10% of nitrogen consumption in the form of calcium cyanamide.

TABLE 5
Urea for Fertiliser Use ('000's metric tons of N)

	1957	1958
Austria	—	2
W. Germany	*	*
France	4.3	4.0
Italy	23.6	45.0
Netherlands	†	31.3
Norway	8.9	13.7
Switzerland	—	0.4
United States	62.0	78.0
Japan	135.7	178.5

* Total production of 'Other nitrogen fertilisers' containing unspecified amounts urea as 44.9 and 51.0 in 1957 and 1958.
† 'Other nitrogen fertiliers' in 1957 was 17.5 containing unspecified amounts urea.

Users of the highest amounts of complex fertilisers (in terms of nitrogen) are in descending order of amount, West Germany, France, Italy, the U.K., the Netherlands, and Norway. In West Germany and France almost one-fifth of the total N consumption is in the form of complex fertilisers.

Consumption of basic slag has remained steady in Western Europe, particularly in France, West Germany and the U.K., but a progressive fall in the relative amount of P_2O_5 consumed as superphosphate is noted. A corresponding increase in the proportion supplied in the form of complex fertilisers is recorded, however.

The F.A.O. report on the fertiliser industries of North, Central and South America and the Far East will be summarised in 'Chemical Age' next week.

TABLE 4
Forms of Phosphate Produced in each Continent, 1957 and 1958 ('000's metric tons P_2O_5)

Fertiliser	Year	Europe	N. America	S. America	Asia	Africa	Oceania	Total
'Single' superphosphate (less than 25% P_2O_5)	1957	1,621	1,312	41	342	167	617	4,100
	1958	1,613	1,224	39	311	167	634	3,988
'Double' superphosphate (more than 25% P_2O_5)	1957	171	676	—	—	99	—	946
	1958	194	789	—	—	105	—	1,088
Basic slag	1957	1,136	12	1	10	—	—	1,159
	1958	1,126	12	3	1	—	—	1,128
'Others'	1957	617	348	54	94	10	—	1,123
	1958	691	373	48	115	9	—	1,236

TABLE 6
World Consumption of N, P_2O_5 and K_2O, 1956-59

Fertiliser	1956	1957 ('000's metric tons)	1958	1959	% Increase from 1956 to 1957	1957 to 1958	1958 to 1959
					%	%	%
All fertilisers ($N+P_2O_5+K_2O$)	19,339	21,746	22,105	23,249	11	3	5
Nitrogen (N)	6,285	6,890	7,258	7,766	10	5	7
Phosphoric acid (P_2O_5)	7,104	7,854	8,098	8,343	11	3	3
Potash (K_2O)	5,950	6,732	6,749	7,140	13	0	6

In Parliament

Data on Industrial Microbiology Research

Asked if the Department of Scientific and Industrial Research would make available information about research in this country similar to the data given in the overseas technical report on industrial and economic microbiology in North America (CHEMICAL AGE, 12 July 1958, p. 61), Mr. H. Nicholls, Parliamentary Secretary, Ministry of Works, said this had already been done. He was referring to the outline of research on U.K. industrial microbiology published by the Stationery Office last year in a British Commonwealth Scientific Conference Report entitled 'Review of industrial microbiology in British Commonwealth countries'.

Mr. Nicholls, who was further asked if he would continue that publication so that as much information would be available as was contained in the North American report, said he would bring the matter to the attention of the Lord President of the Council.

Fog Dispersal Research

Research into the possibility of fog dispersal by extracting moisture from the air over very limited areas through spraying with a chemical solution is in hand by the Meteorological Office. This was stated last week by Mr. Airey Neave, Secretary of State for Air. He added that laboratory trials had been completed and that field trials covering 30,000 sq. yds. at Cardington had shown some promise.

He added that the experiments were not held up by lack of resources, even though the cost of materials had so far only amounted to £100.

(Ammonium nitrate was the chemical used because of its high solubility. Tests were abandoned because the sprayers used were of the agricultural type and not entirely satisfactory for the job. They will be resumed as soon as suitable sprayers are available.

The tests were not an outstanding success, but a thinning of the fog was noticed. The scientific workers believe the research is well worth being followed up. In future spraying will be done from above the fog, but because of the difficulty of flying in foggy conditions, helicopters will probably be used.—*Editor.*)

Crosfield Plants to Close Under Modernisation Scheme

The oil hardening and edible oil refining plants at the Warrington works of Joseph Crosfield and Sons Ltd., are to close down before the end of the year. Approximately 65 men will be affected but in a statement on 18 March, Dr. J. E. Taylor, chairman, gave an assurance that arrangements would be made for them to be transferred to work in other sections.

The two plants are on the Cheshire side of the Mersey. The factory at present straddles the river but under a £5,000,000 modernisation schemes, all production is to be transferred to the north side.

Blackman, Weedkiller Expert, is Among New R.S. Fellows

PROFESSOR F. BERGEL, Professor of Chemistry, Chester Beatty Research Institute, Royal Cancer Hospital, who last week was one of the new fellows elected to the Royal Society, is distinguished for his work in synthetic organic chemistry in the field of vitamins and drugs. Other new fellows, with fields of interest in parenthesis, are:

Dr. Ann Bishop, director, Medical Research Council Group for Research in Chemotherapy, Molteno Institute, Cambridge (a noted protozoologist, particularly in connection with the malaria parasite and its resistance to drugs).

Professor G. E. Blackman, Sibthorpian Professor of Rural Economy, Department of Agriculture, Oxford (ecology of wild and cultivated plants, an expert on selective weedkillers). Professor Blackman is also a director of the A.P.V. Co. Ltd., Crawley.

Dr. F. H. C. Crick, M.R.C., Unit for Research on the Molecular Structure of Biological Systems, Cavendish Laboratory, Cambridge (molecular biology).

Mr. G. B. R. Fielden, director of Research, Ruston and Hornsby, Ltd., Lincoln (development and design of industrial gas turbines).

Professor R. J. W. Le Fevre, Professor of Chemistry, Sydney University and head of School of Chemistry (physical properties of organic compounds).

Dr. S. R. Nockolds, reader in geochemistry, Department of Mineralogy and Petrology, Cambridge (petrology and geochemistry of the igneous rocks).

Professor W. C. Price, Professor of Physics, King's College, London (chemical physics, particularly spectroscopy).

Professor G. V. Raynor, Feeney Professor of Physical Metallurgy, Birmingham University (structure of metals and alloys).

Dr. R. E. Richards, lecturer in chemistry, Physical Chemistry Laboratory, Oxford (nuclear magnetic resonance and its application to chemical problems).

Dr. Robert Spence, C.B., chief chemist and head of Chemistry Division, Atomic Energy Research Establishment, Harwell (chemistry of radioactive elements).

Dr. M. H. F. Wilkins, deputy director, M.R.C. Biophysical Research Unit, King's College, London (reflexion and interference microscopy; structure of nucleic acids).

Plastics Federation Sees No Technical Reason for Change from 'Polythene'

WORLD production of plastics, now about 3 million tons a year, might reach 50-60 million tons in about 25 years, stated Mr. H. V. Potter (Bakelite Ltd.), retiring president, at the 25th annual meeting of the British Plastics Federation on 18 March. British plastics output has already increased by nearly 60 times in just over 25 years—from 7,000 tons in 1930 to the 1959 estimate of over 400,000 tons.

It is stated in the annual report that the main technical committee has recommended that there are no technical grounds for a change from the name 'polythene,' but that different types of the material should be distinguished by reference to their density, e.g., 'polythene density 0.930.' (See also Distillates, p. 536.)

Work is now in hand by the toxicity sub-committee on the expansion of the report issued in February 1958 (see CHEMICAL AGE, 15 February, p. 311) and on the preparation of a revised edition. Negotiations are in hand with the Ministries concerned on the question of the "adventitious occurrence of prohibited materials in foodstuffs due to leaching out from packaging materials."

The analytical methods sub-committee has been set up, under the chairmanship of Mr. J. Haslam, chief analyst, I.C.I. Plastics Division, to develop analytical methods for use in conjunction with the report of the toxicity sub-committee. It has considered methods of analysis for lead, cadmium, zinc and dibutyl tin dilaurate and has carried out tests to prove their suitability. As a result, modifications have been agreed and the methods will be published in due course.

New British Standards under consideration by various committees cover toughened polystyrene rigid p.v.c. sheet (code of practice), polyester and epoxide resins, phenolic moulding materials, cold water tube in high density polythene, p.v.c. flooring, p.t.f.e. materials.

Silicon Rectifier for India

An order for a 27,500 A, 120 volt rectifier equipment has been awarded to Westinghouse Brake and Signal Co. Ltd., 82 York Way, London N.1, by Travancore Cochin Chemical Co. for their chlorine and caustic soda plant. Silicon diodes made in the company's Chippenham works will be used and will be mounted on heavy copper bars which will be cooled by distilled water recirculated through a heat exchanger to river water.

Westinghouse are constructing several other rectifier equipment for chlorine and hydrogen production, using silicon or germanium. The output of those installed and on order now totals 8.5 MW and the company also has several selenium plants in operation.

★ WHAT should be the final shot in the polythene nomenclature controversy has been fired by the British Plastics Federation. Main technical committee of the federation, which covers the U.K. plastics industry, including both manufacturers of plastics materials and fabricators, recommends that there are no technical grounds for a change from polythene. It considers that different types of polythene should be distinguished by reference to their density, e.g., 'polythene density 0.930.'

Thus the federation sees no point in switching to 'polyethylene,' a point that CHEMICAL AGE readers established in our poll last summer when they overwhelmingly favoured 'polythene.'

Despite this 'official' ruling from the Federation, I shall be surprised if the producers of polythene, other than I.C.I. (who pioneered both the material and the name) do not continue to use 'polyethylene.' The companies concerned, all of whom make polythene in this country or who will be on-stream before long, are: British Resin Products (the D.C.L. sales company for British Hydrocarbon Chemicals), Monsanto Chemicals, Shell Chemical and Union Carbide. In view of the sales policies of these companies, the B.P.F. recommendation makes little sense.

★ CHEMISTRY lecturers who read the *Manchester Guardian* report last week of wide scale rioting which forced abandonment of Calcutta University's intermediate examination in chemistry were doubtless relieved to know that no matter how wild their own students are on rag days they do tend to take exams seriously. Invigilators at Calcutta were attacked, answer papers snatched and doors and windows broken.

It is said that nearly 15,000 of the 18,000 chemistry students due to take the Calcutta paper were involved in the systematic rowdyism. The protest was against the stiffness of the paper, but it appears the standard of Calcutta degrees is "already so low that a Calcutta first usually gets dismissed as meaningless by prospective employers."

★ ANOTHER record fertiliser year could be in the offing for 1959. That is the view of Mr. W. J. V. Ward, I.C.I.'s Billingham Division chairman, who says that farmers and agents are ordering busily. He adds "It looks as if farmers in the U.K. will use more nitrogen fertilisers than ever before—more even than last year which was a record." . . . We shall make large quantities of fertilisers this year and I think we shall sell them."

Mr. Ward attributes the current spurt in fertiliser buying to the recent warm spell. However, he anticipates very keen competition, for he says "We have a large new competitor coming in in a few months' time." Doubtless he has the new Stanford-le-Hope plant of Fisons in mind.

It is this aspect of competition that has led the division to organise the biggest party of visitors to see the fertiliser facilities at Billingham on 21 April. More than 400 of the company's fertiliser agents will be shown the most recent developments in fertiliser production. They will hear a speech by Sir Alexander Fleck at a luncheon and at a dinner will be entertained by I.C.I. main board and division board directors as well as representatives of the sales organisation.

★ COMPLETION of the first major installation in the north of England of a rigid p.v.c. underground water main represents a landmark in the history of the British water industry because water authorities have been reluctant to use the material although it has been used for water mains for some time on the Continent.

The main laid for the Mid and South-East Cheshire Water Board, consists of more than 10,000 ft. of 4 in. diameter Chemidus 2000 pipe. The pipe was jointed on site using a special adhesive and, because of its light weight, only three men were needed for the installation which was completed at the rate of 1,500 ft. per eight-hour working day.

Principal advantage of rigid p.v.c. piping is said to be its complete resistance both to internal and external corrosion, high-impact resistance, resilience, lightness and low flow-resistance. Chemidus 2000 piping is made by Chemidus Plastics Ltd., 26 Progress Way, Croydon, from a formulation containing Geon p.v.c.

★ AWARD of an important contract for the design of a plant to recover radioactive caesium from highly active waste materials produced in the processing of irradiated fuel is a major triumph for W. J. Fraser and Co. Ltd., chemical engineers, Romford. No further details of the process are available, as the Atomic Energy Authority, who awarded the contract to Frasers, regard it as secret.

Several of the company's engineers have attended AEA training schemes over the past few years and now back in the organisation will play their part in designing this plant. Three further senior engineers from Frasers have started a one-year course with the Industrial Group specially for training in the design of fuel reprocessing plants, in order to add to the company's resources for offering such plants overseas.

Thus Frasers, who first made chemical plant more than 125 years ago, and who have graduated over the years through the earliest developments in artificial fertilisers and petrochemicals, will now be selling specialised nuclear engineering services in world markets.

★ "A VEIL of ambiguity over a situation of considerable obscurity," was how Mr. John Cronin (Cons., Loughborough) described an explanatory note to an order ending temporary exemption on an aromatic chemical. The House of Commons was further entertained on Wednesday evening last week, when Mr. J. K. Vaughan-Morgan, Minister of State, said that hereinafter he proposed to refer to the chemical concerned—phenylacetaldehyde dimethyl acetate—as 'that stuff.'

'That stuff' was one of the 1,300 items on which duty was suspended under a temporary exemption order. It should have never have been included, however, for after the order had been made the Board of Trade discovered that there was in fact a source of supply of this chemical in the U.K., of which it had "unfortunately, not previously been aware." It was deemed in the national interest, therefore, that the exemption on 'that stuff' should be terminated and the duty reimposed.

Although Mr. Cronin had a very high opinion of the way in which the Minister performed his duty he thought it abundantly clear that Mr. Vaughan-Morgan was not familiar with 'that stuff' and he added "Certainly, he has not such familiarity as one would normally expect. . . ."

Having been firmly convinced that phenylacetaldehyde dimethyl acetate is not a household expression, the House was allowed to consider the more prosaic details of the National Insurance scheme.

★ A NEW booklet that will interest all wine-lovers, particularly those chemists who like to make their own, has come from the pen of Mr. S. M. Tritton, F.R.I.C., of the Grey Owl Research Laboratories, Knole Park, Almondsbury. Although a revision of his earlier 'Successful Wine Making,' it is a virtually new book, having been rewritten and enlarged with no change in the price of 5s.

Like its predecessor, it is not just a recipe book, but encourages amateur wine-makers to adopt the scientific approach which enables faults and errors to be appreciated and corrected. Both the principles and practice of wine making are described and many production details and recipes are given for mead, vermouth, liqueurs, etc.

Alembic

I.CHEM.E. SYMPOSIUM ON FLUIDISATION—I

New Developments in the Frodingham Gas Desulphurising Process

FLUIDISATION was the subject of a symposium arranged in Manchester by the North Western branch of the Institution of Chemical Engineers. Seven papers were read. These were as follows: 'The rise of bubbles in a fluidised bed', J. F. Davidson, R. C. Paul, M. J. S. Smith and H. A. Duxbury; 'Fundamental studies in fluidisation', N. J. Hassett; 'Design of fluidised reactors for naphthalene oxidation', Dr. H. L. Riley; 'Aspects of the development of Frodingham gas desulphurising process', S. A. Gregory; 'Thermodrying in fluidised beds', D. A. Beeken; 'Fluidisation applied to the handling and mixing of bulk solids', F. E. D'Arcy-Smith; 'Fluidised solids techniques in oil refining', D. Clayman.

Details of the Frodingham gas desulphurising process have been described (see CHEMICAL AGE 1958, **79**, 912).
Briefly it entails use of a reactor containing hot iron ore fluidised by the stream of gas from which the sulphur is being removed; the ore is regenerated by continuous circulation to and from another reactor where the sulphur is burned off the iron ore by a stream of fluidising air.

In the paper presented to the Fluidisation Symposium, North-Western Branch Institute of Chemical Engineers, S. A. Gregory, Appleby-Frodingham Steel Co., discussed some aspects of the development of the process and plant having particular interest to chemical engineers.

In 1950, laboratory tests had showed that absorption of sulphur took place readily in hot fluidised iron oxide. Characteristic of a fluidised process was the fairly large pressure drop of gas in passing through the absorption reaction; also there was the problem of dealing with dust from the fluidised bed. Gregory stated that it was possible to justify the use of the fluidised process in the steelworks experiment because of low capital cost. For industrial operation an immediate drawback to the process would be the cost of power for blowing gas through the plant.

By-product Essential

Recovery of some valuable material from the process was necessary in order to offset the cost of operation. In this instance the product was sulphuric acid. If sulphuric acid was to be made, it meant that the regeneration part of the Frodingham process had to be designed to produce sulphur dioxide of suitable strength.

To obtain cheapness in construction five lines of approach were used. The first of these involved building the plant with a minimum of expensive protective material, and making the mild steel construction itself as light as possible. The second was based on the use of relatively high velocities in all pipe work, so that pipe and valve diameters could be kept to a minimum. This resulted in a relatively large pressure loss in the pipe systems compared with normal practise. By-passes and alternative routes were kept few. The most important of the by-passes were around the heat exchangers and the scrubber. Plant units were kept as simple as possible and complex instrumentation was not encouraged.

Principal parts of the plant expected to cause difficulty were those subjected either to erosion or to corrosion at temperature. It was decided that erosion could be avoided as far as possible by confining regions of high velocity flow of solid to straight lengths of pipe (of most significance for the pneumatic conveyor). The most likely cause of corrosion in the absorber circuit was expected to be due to hydrogen sulphide where temperature exceeded 350°C. Use was to be made of good refractory brick in the regenerator circuit protection against high temperature. Mild steel construction was to be used as much as possible and for hot spots a small amount of stainless steel was proposed.

In laboratory experiments, the beds of iron ore had been supported upon plates such as insulating refractory brick drilled with holes 1/16 in. diameter approximately. For the pilot plant the plate was more conveniently made of metal and held on flanges. For large plants attention had to be given to construction of the distribution plates in order to obtain a relatively cheap method of manufacture.

The general method adopted took advantage of the bridging principle, but in horizontally disposed slots instead of in vertical cylindrical holes (patent applied for). Using this principle it was possible to construct distribution plates from a number of strips of suitable metals, each strip having its edges under or over those of its neighbours, thereby forming the slots. Dimensions of the slots were determined in the following way. Thus the total slot-free area through which the fluidising gas passed horizontally before emerging into the mass of particulate solid, was based upon the choice of a horizontal gas velocity which was adequate to convey any particles away from the neighbourhood of the slot. The ratio between the chosen overall fluidising velocity and the slot velocity, it was stated, gave the relationship between the slot area and the cross-section of the bed. Thus, with a fluidising velocity of 1 ft. per second and slot velocity of 30 ft. per second, the slot area is 3.3% of the bed cross-section. Width is only important if it is necessary to prevent substantial flow-back of solid.

The pilot plant operated satisfactorily; with a single bed in the absorber it was possible to obtain up to 90% removal of sulphur from debenzolised coke-oven gas. Following these successful demonstrations, a large-scale plant was ordered sufficient to treat the total make of gas at the Appleby-Frodingham coke ovens. This plant was now being built.

Reasons suggested for the success of the plant by Gregory were as follows: (1) The process was simple, consisting of two stages; (2) there were normally no sticky products or intermediates; (3) little corrosion; (4) process operated at near atmospheric pressure; (5) Frodingham Research Department's experience in design and operation of fluidised reactors.

Two unknowns might have jeopardised magnification of the process. The first was the behaviour of shallow fluidised beds of large diameter. Tests made in a rig with a bed 8 ft. long and 1 ft. 3 in. wide had shown the possibility of obtaining fluidisation with random bubbling using a distribution plate design as described above. Satisfactory performance was obtained in this rig with beds as shallow as 3 in.

The second doubt concerned the reported inefficiency of large diameter beds due to 'back-mixing' of the gas. The indication of the most recent large-scale experiment on the subject had been against substantial back-mixing.

Behaviour of the present plant sug-

L. to r., P. Ayres, Dr. H. L. Riley, Dr. J. F. Richardson and Professor Frank Morton, chairman, Northwestern branch, Institution of Chemical Engineers

At the symposium on fluidisation, l. to r., Dr. D. Harrison, J. F. Davidson, S. A. Gregory and F. E. D'Arcy-Smith

gested that the important factor which affected performance on the magnification of any type of fluidised process was by-passing of gas in bubbles. The bubbles, Gregory stated, increased in size as they rose through the bed and in a bed not limited by walls, a large proportion of the gas passing up through a horizontal plane was contained in a few large bubbles. The most effective part of the bed, therefore, was that below the region of substantial bubbles.

On this hypothesis plants which were magnified most successfully were those where the process was achieved in a shallow bed.

Particle size, particle size range, and gas properties affected the rate of bubble growth, it was noted. There had been no opportunities of investigating these variables on the pilot plant.

Fluidisation Applied to Handling and Mixing of Bulk Solids

DESCRIPTIONS of some recent installations which—though specialised—incorporated detail applications that may be suitable for wider use were given by F. E. D'Arcy-Smith in his paper on 'Fluidisation applied to the handling and mixing of bulk solids'.

One such plant was concerned with the reception of light soda ash, its storage and consumption in batches of 2 cwt. at a time. A near-horizontal fluidised trough conveyor collected the ash from any one of four outlets and delivered through a surge hopper to a pressure vessel powder pump which forced the fluidised material in batches through a pipeline by means of compressed air. The ash could then be delivered either to a silo for storage or to a surface hopper. About 30% of the almost horizontal floor of the silo was formed by aeration boxes the permeable surface of which allowed for introduction of air required for the fluidisation of some or all of the silo contents.

Time required for emptying of a Covhop bringing the ash (17 tons) and delivering this to the storage silo was of the order of one hour and the power required in the form of compressed air amounted to about 3½ units per ton.

D'Arcy-Smith mentioned a plant that conveyed about 120 tons per hour of ground anhydride over a horizontal distance of about 130 yards and rising about 60 ft. which had turned a previously very dusty and dirty process into a completely clean operation and had replaced extensive and cumbersome mechanical conveying equipment by three 4 in. diameter pipelines.

The power requirement in this plant was of the order of one unit per ton of anhydride conveyed.

Another installation it was reported that conveyed silica powder at the rate of 30 tons per hour over a pipeline distance of 300 yards had cut maintenance costs from £15,000 per year to less than £2,000. A storage and dispensing plant for the fluidised handling of phosphate salts in bulk instead of in sacks, suitable for capacity of 30 tons per hour, had brought overall economies amounting to about 18s 0d per ton.

Not every or any powder could be handled by these or similar means. Success depended entirely on the fluidising characteristics of the material in question. There were some powders which could be fluidised only if mechanical stirrers were used to prevent the collapse of the fluidised state. Such stirring devices prohibited the application of some of the features referred to above because of the complication of the equipment involved.

The 'mixing' by fluidisation air passing upward through the bed or column of powder tended to travel mainly in the core of the column and gradually caused circulation with a clearly defined downward movement of particles on the wall of the container and a rising stream in the centre. This movement of the individual particles became disorganised and irregular when the air velocity was high enough to cause 'boiling', but it was maintained as long as the fluidised state was not destroyed by channelling. 'Boiling' of a fluidised bed was caused by the formation of air bubbles within the mass of powder. These bubbles rose to the top and in doing so lead to 'slugging' of power also.

Experiments carried out by D'Arcy Smith had demonstrated the need for caution when considering mixing by fluidisation. It was fortunate, he remarked, that a good many industrial powders consisted of particles which, both as regards size and weight, were such that air velocities allowing fluidisation did not lead to segregation. Such powders could be mixed by fluidisation. Mixing by this means was usually carried out in a cylindrical silo, the floor of which was permeable to allow the introduction of air.

Developments had led to a method which provided for a division of the floor area into rings and sections of rings, each section being supplied with air at such rates that different velocities which caused different rates of expansion and therefore different particle velocities resulted in a spiral movement of the mass of powder superimposed on which were the different upward velocities and the turbulence effect of air bubbles and slugs of powder.

Very large mixing silos of this type were in operation and the accuracy of mixing achieved at relatively low power cost and short mixing periods was referred to.

Conveying and elevating of powders by fluidised pump over relatively short distances might be less economic than by the more conventional bucket elevator. On the other hand with fluidised pumping, the provision of extra two-way valves and additional lengths of pipeline for the purpose of cross-connection, by-passing or duplication of conveying possibilities allowed a degree of flexibility in overall geographical arrangement, and in operating methods which was much more difficult, if not impossible to provide economically using mechanical conveyors.

It was suggested that the power required for mixing by fluidisation might be of the order of 0.2kWh per ton of meal or less. Exceptionally severe working conditions, together with very casual operating technique, would have to coincide if the power requirement were to rise to as much as 0.5kWh per ton.

Other papers presented at the symposium will be summarised in our next issue.

European Conference on Market Research

MARKET research on a European scale is to be considered at an international conference to be organised by the European Productivity Agency in or near Paris from 29 June to 1 July. Aim of the conference is to give not more than 100 specialists the opportunity of examining the means of analysing and forecasting markets in a wider European framework.

Two main questions to be considered will be (1) problems of providing firms and market researchers with information to guide both overall and marketing policies and (2) problems of using information.

Applications for participation should be made before 13 April to Mr. D. R. Griffiths, Incorporated Sales Managers' Association, 51 Palace Street, London S.W.1.

NEW CHEMICALS SEEN AT O.C.C.A.

Younghusband, Barnes Exhibit Chemicals made for First Time in U.K.

BY the time the eleventh Technical Exhibition of the London Section, O.C.C.A., closed at 7 p.m. on Thursday 19 March more than 5,500 visitors had attended the New Horticultural Hall, London S.W.1.

A great number of the new products and development chemicals shown were described in our exclusive nine-page preview of the exhibition in CHEMICAL AGE, 14 March. The following report deals with new products not covered in that preview, some of them being included on stands at the last minute. Prominent among new developments shown were those of **Younghusband, Barnes and Co. Ltd.,** King and Queen and Upper Globe Wharves, S.E.16.

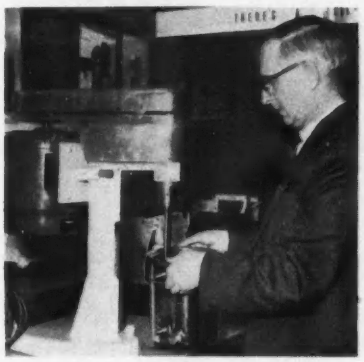
The surprises they sprang at the exhibition under the theme of 'Technical enterprise' are all claimed to be products new to this country. First are the methyl esters of soya bean oil fatty acids, now available in bulk; the linseed ester will be available in bulk shortly, as will pilot-scale quantities of methyl esters of the fatty acids of tung oil and castor oil. In the alkyd field, methyl esters can be considered as alternatives to both fatty acids and triglyceride oils, in the latter case enabling alkyds based on polyols other than glycerol, e.g. pentaerythritol, trimethylolpropane, epoxy resin, etc., to be conveniently made.

Methyl esters are said to give easier storage and improved colour retention. It is anticipated that they will have applications as chemical intermediates for esterifying alcohol groups, the preparation of amides and other nitrogen derivatives and for use as plasticisers.

A new research programme on water-soluble media started with three objectives—the last of which is still somewhat nebulous by virtue of its ambition. These are: 1, an oil with drying properties having complete water and hydrocarbon solubility, with good tolerance for all normal paint vehicles; 2, development of this material to give a film suitable at least for water-based high-gloss paints; 3, a two-fold product perhaps suitable for both glossy exterior paints and stoving finishes and yet having water as the only solvent and thinner.

Wybesol 1 is the name given to the product as the result of work on stage 1 and it is thought of as a basis for the production of a 'universal tinting medium'. Stage 2 is being transferred from the laboratory to pilot-plant scale and production evaluation and production testing remains to be completed.

Work in the field of processed vegetable oils for use as mastics had two main lines of approach, each of which has resulted in a new product. Mastic oil ST is based on a hydrocarbon/vegetable oil dispersion produced by a process that allows the oil polymerisation to be taken to a high level and yet maintain complete dispersion. Polymerised sperm oil represents a technique that produces polymers not previously available. The polymer is said to be non-drying and finds use as a plasticiser.



R. G. Baines, manager, sales division of Steele and Cowlishaw Ltd. with the new Stell-Shaw variable speed super-rapid disperser for the production of homogeneous dispersions of pigments and chemicals in liquid media

In their new work on surfactants, Younghusband, Barnes state that pilot plant quantities of the detergent synergist lauric diethanolamide have been produced and assessed. With their subsidiary Y.B. Bavon Ltd., research is continuing on lubricating oil additives acting as anticorrosives; this work is based on a new approach to the problem. Bavon surface-active compound is said to give complete liquid water impermeability to leather, e.g. shoe uppers. Developments are envisaged which will enable other industries to import water-repellent properties to their products.

In another field new to them, the company state that copolymers of soya and tung oils giving drying properties similar to those of linseed oils are particular interest.

Future developments include a range of dibasic acids for use as a new liquid non-volatile curing agent for epoxide resins, as intermediates for alkyds, polyesters and perhaps polyamides, as well as other nitrogen derivatives and surface active agents.

Hexylene Glycol as Film Fusion Agent

One of the main features of the Distillers Company Ltd. Chemical Division's stand was a display showing the use of hexylene glycol as a film fusion agent in p.v.a. copolymer films.

Two paint films supported on filter papers were sealed in Perspex cells and compressed air from a common source was passed through the cells and then into vertical cells containing coloured water. The resultant bubbles in the tube showed that the addition of hexylene glycol considerably reduced permeability of the film.

Berk Offer First U.K. Sepiolite

Sepiolite, a pure hydrated magnesium silicate possessing remarkable absorptive and adsorptive capacity, is now available for the first time in the U.K. from **F. W. Berk and Co. Ltd.**, Berk House, P.O. Box 500, Portman Square, London W.1, who had technical literature on their stand. It is stated that excellent filtration characteristics have been noted with many of the Sepiolite grades.

Suggested uses cover aerosols, where low density and high carrying characteristics commend powdered Sepiolite. Its feathery or hairy aggregates have good suspension properties in air and good adherence to vegetation. Having what is said to be the highest capacity of any known clay as a carrier for toxic com-

Left, Mr. S. L. Fulton (Baldwin Instrument Co. Ltd.) demonstrates the company's new densitometer that is used in conjunction with their photometer type MNB to measure the transmission density of liquids. Right, C. R. Malyan (Younghusband Barnes and Co. Ltd.) with G. Speding (Shand Kydd Ltd.) on the right

Left, J. Taylor, technical service manager Laporte Chemicals Ltd., demonstrates the new Runa RH 20 to S. Phillpots (B.I.P. Chemicals Ltd.). Right, on the British Titan Products Co. Ltd. stand are J. R. Bourne (Alex. Cameron and Sons Ltd., Sunderland), left, with R. R. Blakey (B.T.P. physicist)

pounds it is suitable for carrying high concentrations of toxaphene, aldrin, dieldrin and similar waxy substances. Added to liquid formulations, Sepiolite will act as a carrier while giving suspension properties.

High specific surfaces and sorptive capacity suggest the value of the product as a catalyst carrier and a wide range of graded mesh sizes is available. A powdered Sepiolite bonded with, say, phosphoric acid or an acid phosphate, may have a catalytic effect in its own right in certain applications.

Other uses will, it is suggested, be found in ceramics, while for cosmetics and pharmaceuticals, it has good suspension properties in many aqueous and organic systems; it will also act as a clarifier by the adsorption of solids or the absorption of traces of oil or moisture. Drilling muds, saline suspensions, dry cleaning, gelatine, glucose and syrups, molecular sieving (for the separation of liquids or gasses of different mol. wt. in a mixture), paints and inks, paper and paper coatings; wax compositions, and wine and vinegar fining, are other suggested uses.

Tributyl Tin Acetate Increases Viscosity

In results of experiments involving the use of sodium carboxymethyl cellulose (S.C.M.C.) and methyl-cellulose (M.C.), **British Celanese Ltd.**, Foleshill Road, Coventry, state that contrary to expectations tributyl tin acetate in combination with P.C.M.C. in fungicides gives rise to large viscosity increase when the plant is stabilised with M.C. at both the normal and high pigment loadings. When the acetate is used with no bactericide, this viscosity increase is much less marked. Comparison of the fungicide in paints stabilised with S.C.M.C. and M.C. showed that the tributyl tin acetate gave the greatest viscosity increase, particularly marked with M.C., while the resinate and oxide both gave similar smaller changes and those with phenyl mercurial showed the smallest viscosity changes.

Details of three higher vinyl esters—vinyl propionate, vinyl caprate, vinyl stearate, development quantities of which are now available— were also given by British Celanese. These vinyl esters of other fatty acids are said to offer the advantage over other comonomers in that the physical and chemical properties of the resultant copolymer are unaffected by the ester interchange which may take place on ageing.

Vinyl stearate monomer

$(CH_2:CH.O.CO.(CH_2)_{16}.CH_3)$

has a number of suggested applications. It is reported that vinyl stearate homopolymers can be prepared by solution, suspension, emulsion and bulk polymerisation. The solid polyvinyl stearate is a hard synthetic wax that is dispersible in water and is compatible with most waxes, including beeswax.

Vinyl stearate can also be copolymerised with a wide range of monomers, such as vinyl acetate, vinyl chloride, styrene, acrylic ester, acrylonitrile, butadiene and maleic anhydride. It is soluble in benzene and carbon tetrachloride; partially soluble in acetone, ethyl acetate, and methyl ethyl ketone and insoluble in water, diethylene glycol and monoethanolamine.

Vinyl caprate monomer

$(CH_2:CH.O.CO.(CH_2)_8.CH_3)$

will have its main use as comonomer with vinyl acetate; it serves as an effective internal plasticiser in the polymer. A colourless liquid, it has a mol. wt. of 198.3 and a boiling point, at 16 mm.Hg., of 118°C.

Vinyl propionate is readily polymerised and the homopolymer is soluble in many organic solvents, including methylene chloride, carbon tetrachloride, benzene, acetone, methanol and ethylene glycol diacetate. The polymer also dissolves on warming in *n*-butanol, xylenes and methyl ethyl ketone; it is insoluble in ethylene glycol.

It polymerises at the same rate as vinyl acetate and does not therefore lengthen the reaction time. It has been found that a 20-30 vinyl propionate/80-70 vinyl acetate copolymer with a small proportion (1-5%) of external plasticiser gives paint films of good water-resistance, while a 50-60 vinyl propionate/50-40 vinyl acetate copolymer gives a satisfactory internally plasticised film.

Price's Fatty Acids for Surface Coating

At the exhibition, **Prices (Bromborough) Ltd.**, Bromborough Pool, New Ferry, near Birkenhead, had new literature available. This included a technical bulletin on Prifac brand castor oil fatty acids and technical publication No. 3 on 12-hydroxystearic acid (hydrogenated castor oil fatty acids) production of which started last year.

Technical publication No. 4, dealing with fatty acids for surface coatings, gives a full account both of early and recent work in this field. Esterification and advantages of fatty acids, which avoid an alcoholysis stage giving a shorter process, are explained under the heading 'alkyd manufacture'. It is said that solvent fractionation of resins prepared by fatty acid and monoglyceride methods and which had the same basic composition, showed fatty acid products to have a more uniform molecular weight.

The booklet then discusses long-, medium- and short-oil alkyds, epoxide resins, and miscellaneous uses of fatty acids, comprising polyamide resins, 'in situ' varnishes, soaps and driers. It is stated that polyamines like ethylene diamine are condensed with dimeric fatty acids or with unsaturated fatty acids, like Price's D.6 white distilled linseed oil fatty acids, and polymerised at 280°C until they have a suitable melting point. For 'in situ' varnishes, a recently developed resinous polyhydric alcohol, when esterified with fatty acids, yields media with good chemical resistance. The chemical backbone is formed entirely by carbon-to-carbon linkages.

A bibliography and three nomograms completes this publication.

Nobel's New Di- and Trihydric Alcohols

Two new development products introduced by **I.C.I. Nobel Division,** 25 Bothwell Street, Glasgow C.2, were neopentyl glycol and trimethylol-propane. Neopentyl glycol is a dihydric alcohol with a molecule that is unusually resistant to thermal degration. Derivatives of the diol, such as the esters, also possess excellent heat-resistance. The polymeric esters made from neopentyl glycol and dibasic acids are of interest as plasticisers. These can be made from neopentyl glycol and a dibasic acid such as adipic acid, using a monobasic acid, or a monohydric alcohol such as 2-ethylhexanol, as an 'end stopper'.

It is claimed that polymeric plasticisers made from neopentyl glycol and adipic acid, chain-ended with 2-ethyl hexanol, can be easily compounded with p.v.c., while showing excellent permanence and non-migratory properties. These plasticisers can greatly reduce or eliminate the surface marring or other deterioration of polystyrene or nitrocellulose.

Other uses in the plasticiser field are in p.v.c. plastisol formulations, for electrical applications, while polyesters can be made from neopentyl glycol using mixed dibasic acids and it is possible to include a proportion of one of the phthalic acids. The di-esters of neopentyl glycol are also of interest as plasticisers.

Polyesters based on neopentyl glycol can be used as components of solid or foamed polyurethanes.

Trimethylol-propane, a trihydric alcohol, has a molecule that contains the neopentyl carbon skeleton; three primary hydroxyl groups; and an ethyl-group side-chain. Thus the material has the following advantages: higher resistance to thermal degradation; the hydroxyl groups react at a more uniform rate in alcoholysis, esterification and other reactions, allowing better control and more complete reaction; trimethylol-propane and in its compounds is more compatible with organic reagents and solvents.

Uses are suggested in polyesters that can be heated to 200°C; in wire enamels, as a cross-linking agent in polyurethane resins or foams; low-temperature lubricants; plasticisers (U.S. Patent 2,578,688); adhesives (U.S.P. 2,755,303 describes the dimethacrylate which polymerises to a hard polymer); as a humectant; as a foaming agent for galvanising baths; as an intermediate for surfactants; synthetic drying oils; and for textile smoothing warps prepared in a reaction with ethylene oxide.

For polyurethane surface coatings, the use of polyesters of various chain lengths, formulated with different proportions of trimethylol-propane and di-isocyanate, gives resin finishes with a range of properties—at one extreme they will be hard and tough, and at the other, soft, rubbery and elastic materials are obtained. These are said to offer an outstanding combination of properties as regards chemical inertness, solvent resistance, gloss adhesion, dielectric strength and heat-resistance.

B.T.P. Theme is Tioxide's 'Hiding Power'

Literature made available by **British Titan Products Co. Ltd.**, 10 Stratton Street, London W.1, dealt with the 'hiding power' of Tioxide. As the 1958 exhibition, B.T.P. gave only an introduction to the subject of opacity and in view of the interest aroused it was decided to make the theme of the 1959 exhibit a more detailed discussion of the topic.

Tioxide for 'hiding power' deals with the effect of different extenders on the formulations exhibited, while B.T.P. publication 66, 'A guide to the formulation of titanium dioxide pigmented paints for maximum opacity', discusses the definition and measurement of hiding power. The booklet then deals in detail with gloss paints, flat oil paints, pastel shade gloss paints, and common undercoats for pastel shade finishes. It is stated that to develop maximum opacity in a TiO_2 pigmented white air-drying gloss paint, the pigment/binder ratio should be about 1.6/1, although little improvement has been found by raising the ratio beyond 1.3/1.

Bayer Exhibits

Available on the stand of **Farbenfabriken Bayer**, Leverkusen, West Germany, was literature dealing with some of the company's more recent products. These included Roskydal 500 B, 530 and 540 air-drying unsaturated polyester resins, which dry to give tack-free surfaces without the addition of air-sealing material; and Desmodur CT stable and Desmophen F 950, which with cresol or xylenol as a solvent, and solvent naphtha or xylene or toluene as a diluent, provides an enamel suitable for the production of enamelled wires. Desmodur CT stable is a masked polyisocyanate of a hard resinous nature, the isocyanate groups of which only react at temperatures above 120-130°C, while Desmophen F 950 is a polyester containing OH groups and is built-up on the terephthalic acid base.

Inspecting a display of consolidation of the p.v.a. copolymer film on the large stand of the Distillers Company are, l. to r., P. F. Fossey (D.C.L.), H. T. Goldham (Dewey and Almy Ltd.), D. G. Chapman (D.C.L.), and J. Grey (chief chemist, W. Symonds, Stratford).

Laporte's New Runa has Good Dispersion

Their new Runa R.H. 20, which offers good dispersion, is a further development by **Laporte Titanium Ltd.**, 14 Hanover Square, London W.1, of their Runa R.H. The new product is a treated rutile-type titanium oxide of high opacity and maximum chalk resistance, free from oversize particles and processed so as to be easy dispersing. Minimum content of TiO_2 is 94%; specific gravity is 4.2; oil absorption, 20-22 gm./100 gm.; sieve residue, 240 mesh is less than 0.01%; packed bulk density is 0.98 gm./c.c.; water solubles content is very low. The product is stable in most media, but may possibly react with very high acid value, highly polymerised media. It is suitable for all types of paints and enamels, printing inks, loaded papers for impregnating with laminating resins, and moulding powders.

With their recently introduced Tiona V, Laporte Titanium were the first European firm to devote a full production line to a titanium oxide for vitreous enamellers. Tiona V is a fine granular powder, all of which passes a 60 mesh and most of which passes a 200 mesh. Solubility in enamel frits is said to be excellent and its use eliminates costly cleaning-out operations. There are three types to give blue tones, neutral tones, or the maximum reflectance and slightly creamier tones.

Further details of developments summarised are given in technical literature available from the companies concerned, or from CHEMICAL AGE, 154 Fleet Street, London E.C.4.

L. E. Norris, Premier Colloid Mills Ltd., seen assembling the new Premier Multipurpose colloid mill for emulsifying, dispersing and disintegrating

Mechanical Power from Vaporising Liquid Gas

REFRIGERATION available in liquid gases such as oxygen, nitrogen or methane is destroyed when the gases are vaporised into pipelines for supplying industrial plant and heat, either from an electrical store or from steam has usually to be supplied to effect vaporisation. An invention patented by British Oxygen Research and Development Ltd., utilises this refrigeration to produce mechanical energy. (British Patent 808535.)

In the process the gas is compressed in the liquid state to a pressure well above that required at the gas delivery point. Heat is supplied to the liquid gas from a natural heat store, such as the atmosphere or a river, and the gas produced is expanded in a turbine or reciprocating expander. The expanded gas is then further warmed to about room temperature by means of the natural heat store.

Work required for the purpose of compressing the original liquid gas will only be a small fraction of the total produced in the expansion engine and the balance is available as free mechanical power. This power can be used for any suitable purpose, for example, the production of electrical energy.

C.T.R.A. DIRECTOR DISCUSSES VARIOUS PURIFICATION PROCESSES FOR NAPHTHALENE

FIGURES taken from the Ministry of Power Statistical Digest for the production of naphthalene in 1950, 1955, 1956 and 1957 were quoted by Dr. D. McNeil, director, Coal Tar Research Association, near Gomersal, Leeds, when he delivered a paper on 'Some factors in the production of naphthalene from coal tar' to the Midland Section of the Coke Oven Managers' Association recently.

In 1955, the last year for which complete statistics are available, 574,931 tons of horizontal retort and intermittent vertical retort tar, 1,256,879 tons of continuous vertical retort tar and 1,101,294 tons of coke oven tar were produced. Potential production of naphthalene was therefore almost 180,000 tons as against an actual production of 50,000 tons. This marked difference between potential naphthalene available and the amount actually produced, was predominantly due, stated Dr. McNeil, to the low realisation which this by-product from coal tar commands.

Poor Recovery

There was poor recovery of naphthalene by primary distillation in pot stills compared with recovery obtained using a Wilton or Koppers pipe still. Use of the modest degree of fractionation obtainable on a Wilton plant side stream column, however, allowed a high proportion of the naphthalene to be recovered in the naphthalene oil. A fairly wide boiling range oil had to taken and the naphthalene content of the oil would not exceed 50%. From the amount of the available naphthalene recovered in the primary oil and as crude drained naphthalene, it was preferable to operate the primary distillation step to yield a larger amount of more dilute oil. This could lead to difficulty, nevertheless, in producing phthalic-grade naphthalene by crystallisation.

Ease of upgrading naphthalene oils to 78°C c.p. naphthalene by fractional distillation depended on the amount and boiling point of material other than naphthalene present. So many of the possible components of tar which boiled in the naphthalene oil range were phenolic and emphasised the need to alkali wash the oil prior to either distillation or crystallisation. It appeared that the results obtained by refractionation of a washed naphthalene oil would depend particularly on the amount of dimethyl coumarones, paraffins and thionaphthalene in the oil. Calculation of the enrichment of naphthalene which could be achieved on refractionation on a column of stated efficiency was precluded, Dr. McNeil said, by the difficulty of completely analysing a naphthalene oil and lack of data on the properties of the components.

From the few results available on which distillation in batch stills and in continuous stills of similar efficiency could be compared, it appeared that the recovery at a given naphthalene purity or the purity at a given recovery were somewhat better when two continuous columns of n plate equivalents were used instead of one batch column of n plate equivalents.

Industry had found that the Pro-Abd type process in which a naphthalene oil was crystallised in water-cooled stirred tanks and the slurry centrifuged and then washed with hot water or dilute caustic soda, was easier to operate to yield a 78° c.p. naphthalene if the oil was of vertical retort origin, than if it was derived from coke oven tar. In operating this type of recovery process it was essential that in the primary distillation step, the naphthalene oil should be cut so that indene was cut out at the lower boiling end and materials like acenaphthene, diphenyl, diemethyl naphthalenes, etc., were not brought in at the higher boiling end. This latter precaution was much more important in the case of coke oven oils. It was also advisable that the crystallising temperature should not fall below 25°C, the crystallising point of the naphthalene β-methyl naphthalene eutectic.

Naphthalene Statistics 1950—1957

Year	White Naphthalene (tons)	Hot-pressed Naphthalene (tons)	Crude Naphthalene (tons)	Total Tons
1950	12,000	13,900	14,000	39,900
1955	9,600	20,800	19,600	50,000
1956	10,500	22,600	19,000	52,100
1957	8,700	19,600	20,700	49,600

It had been hoped that an explanation would be provided for the so-called 'sugar' crystals occasionally encountered in industry which proved more difficult to upgrade than normal material. Washing with moderately concentrated sulphuric acid would be effective, it was stated, in removing indene and any basic material while refractionation of moderate efficiency would suffice to remove methyl naphthalenes and higher polycyclic hydrocarbons. For the remaining and most refractory impurity—thionaphthene—no really attractive method had yet been found. Much work had been done on this problem and three methods had been disclosed. The first was based on the fact that thionaphthene condensed more rapidly with formaldehyde than naphthalene. Naphthalene was treated with aqueous formalin or paraformaldehyde in presence of sulphuric acid, the thionaphthene was converted to a resinous product, which was left behind as a residue when the naphthalene was distilled. The disadvantage was the low recovery.

The second method was by catalytic desulphurisation. Passage of naphthalene vapour and hydrogen over a desulphurisation catalyst under the appropriate conditions reduced the sulphur content from 0.5% to 0.01% without any measurable loss of naphthalene. There were three disadvantages to this process. First, reported Dr. McNeil, it had to be carried out at super atmospheric pressure and the capital cost of the plant was high. Second, catalyst life was relatively short and regeneration of the catalyst every 100 hours by burning off carbon was necessary. Third, even under the optimum pressure and temperature conditions, some slight hydrogenation of the naphthalene occurred with a consequent slight decrease in the crystallising point.

The third method where reaction with metallic sodium was used, was the basis of the process employed commercially. By this treatment, thionaphthene was partly converted to sodium sulphide and phenyl acetylene and partly to polymeric products. Recovery of purified naphthalene with a crystallising point higher than the original material was normally above 95%. Disadvantages of this process, were, that it was a batch process, was costly in chemical consumption and there were five hazards involved in large-scale usage of metallic sodium. It was, however, the most economic method.

More Complex Chemical Processing Challenges the Skill of the Operator

THE contribution that the qualified chemical operator makes to productivity and efficiency in the chemical industry was the subject of the main address at a conference held in Birmingham on 17 March and attended by 120 qualified operators in the area. Also invited were all apprentices under training in the area.

The conference was organised by the Birmingham area committee of the Association of Chemical and Allied Employers' schemes of training for qualified chemical operators. It is believed to be the first of its kind ever held. Mr. G. M. Hopps, chairman of the Birmingham area committee, presided. During the meeting, area prizes were presented to the two most successful students at the intermediate stage.

In his main address, Mr. J. K. Bottomley, Albright and Wilson (Mfg.) Ltd., said that in an age of increasing automation, the control exercised by the process worker was by no means diminished. On the contrary, the more complex the process, the greater the challenge to the operator's skill. Increasing world competition made it necessary for each man in the industry to make his maximum contribution to efficiency.

Mr. J. T. Collins, of the association, reviewed the progress of the scheme nationally and indicated that a number of problems were receiving the attention of the Joint Industrial Council, which was satisfied with progress so far made.

Opening the discussion, Mr. G. E. Kingdon, N.U.G.M.W. district organiser, said that the chemical industry in its advancing technology still owed much to the skill of the individual operator.

Overseas News

MAX-PLANCK'S TRIMERISATION OF BUTADIENE TO CYCLODODECATRINE

NOTEWORTHY result of experimental studies by the Max Planck Institute for Carbon Research (Max-Planck-Institut für Kohlengorschung) of Mulheim-Ruhr, West Germany, published in a report for the years 1956-58, is the discovery of a very simple method of trimerisation of butadiene to cyclododecatrine using organo-metallic co-catalysts. Experiments are being continued in two directions—the first to the theoretically interesting cyclodecapolyenes, with more than three double linkings (in particular, cyclododecahexaene is being studied) and the second to cyclododecanone, cyclododecanone isoxide and a new super polyamide, as well as to the straight-chain dicarbonic and with 12 carbon atoms.

Work on the production of tetraethyl lead by the combination of lead, ethylene and hydrogen, in which decisive steps have been taken recently, is nearly concluded. Connected with this line of study is that of the electrolytic production of metallic alkyls. As a result of Professor Karl Ziegler's work, development work has concentrated on the more detailed evaluation of the make-up of chemical properties of the organic aluminium compounds. Interest in this field has centred on the states of equilibrium between aluminium trialkyls and dialkyl aluminium hydrides plus olefins, as well as on the so-called 'displacement equilibria' between aluminium trialkyls and olefins. Resulting from these experiments is the possibility of combining ethylene and propylene to give isopentrane 'in a way contrary to the laws of probability.'

Rhône-Poulenc set up Vietnam Firm to make Pharmaceuticals

The French chemical producers, Rhône-Poulenc, have set up a Vietnamese company under the name of Vinaspecia to produce "all pharmaceuticals" under Rhône-Poulenc licences and with their production processes. Vinaspecia will be owned 49% by Specia Rhône-Poulenc, a subsidiary, and the Vietnamese company Vinacifa. The new company will manufacture particularly with the Indonesian market in mind.

Hoechst Set-up New Firms in U.S. and Philippines

As a step towards intensification of exports by Farbwerke Hoechst AG., two new American associate concerns of the company have been set up; in New York the Hostawax Co. and in Manila, Hoechst-Marsmann Inc. The first company is a subsidiary of Progressive Color and Chemical, New York, and will distribute the waxes made by the German company at its Gersthofen plant. The second is a joint venture between Hoechst and the old-established Philippine trading house Marsmann and Co., and will distribute Hoechst products generally in the Islands. It is also planned that the new company will set up a pharmaceutical business during 1959.

Polish Delegation in Italy

A delegation of Polish technicians on a two-week visit to Italy have visited the A.N.I.C. synthetic rubber and fertiliser plant at Ravenna. Their visit is said to be connected with Poland's programme to expand production of synthetic rubber, plastics materials, nitrogen and phosphate fertilisers.

Hungarian Plant Will Produce Danulon

A factory for producing Danulon, the Hungarian version of Perlon, was opened at the end of February in Nyergesujfalu. It was equipped by East German chemical engineers and has an initial annual output of 300 tons of caprolactam.

Rumanian Polythene Plant on Stream This Year

Production of polythene will start this year at the Rumanian State-owned Brazi petrochemical plant, as part of a large-scale plastics development programme. Under the same plan, production of p.v.c. will start at the Turda chemical plant and manufacture of phenol, acetone and Teran synthetic fibre at other plants.

Battelle to Build Plutonium Laboratory

Battelle Memorial Institute, Columbus, Ohio, are to expand their research in nuclear fuel elements with a new laboratory designed for the study of plutonium. Scheduled to be in operation by summer this year, it will be the first U.S. privately financed facility for plutonium research.

Soviet Chemicals Production

Figures recently issued from the Soviet Union on the growth of the chemical industry show that while in 1913 some 69,000 tonnes of mineral fertilisers, 160,000 tonnes of calcined soda, 121,000 tonnes of sulphuric acid and 9,000 tonnes of synthetic dyes were produced, by 1956 these totals had reached, respectively, 10,906,000, 1,545,000, 4,323,000 and 77,400, and by last year, respectively, 11,770,000, 1,618,000, 4,569,000 and 76,500.

Het-acid from Hooker Chemical

Het-acid is the name given by the American Hooker Chemical Co. to a new compound containing 54.7% stable chlorine. Het-acid is the product of diene synthesis of maleic acid and pentachlorcyclopentadiene. It forms, with glycols and other polyols, resins suitable for the manufacture of inflammable alkyd resins.

West Europe's Petrochemical Output up 30%

West Europe's output of petrochemical products rose by 30% to 830,000 tons in 1958 reports Deutsche Shell. By the end of 1960, the report states, it is expected that output will reach an annual rate of nearly 2 million tons—large enough to satisfy most of West Europe's demands.

Leading producers were Britain with 327,000 tons, West Germany with 187,000 tons, France with 142,000 tons, Italy with 130,000 tons and the Netherlands with 45,000 tons. Investments in the industry are expected to total $640 million by the end of next year. Of this, $181 million will be spent in Britain, the report states.

Two New Goodyear Rubbers Extended with 50 Parts of Oil

Two new synthetic rubbers, Plioflex 1713 and Plioflex 1714C, extended with 50 parts oil and which can be processed easily on standard rubber processing equipment have been introduced by the Chemical Division of the Goodyear Tire and Rubber Co., Akron, Ohio. Through rigid controls of ingredient selection and manufacturing conditions, Goodyear has overcome the problems of producing a 50-part oil extended rubber having the necessary physical properties for easy processing into quality end products.

Plioflex 1713 is a non-staining, non-discolouring cold rubber extended with 50 parts of naphthenic type oil.

Plioflex 1714C is a cold rubber extended with 50 parts of a highly aromatic oil. It is a staining type rubber which plasticises efficiently and gives maximum processing and physical properties at minimum cost. Stabilised with Goodyear's recently introduced Wingstay 100, an antioxidant antiozonant, it has good raw polymer stability and high resistance to ozone and oxygen.

East Germany plans to make Polyester Fibre, Lanon

Production of a polyester fibre called Lanon, is planned to start in Eastern Germany in 1963. Primary production will be 5,000 tonnes a year, rising to 10,000 tonnes annually by 1965. It has been stated, however, that some of the necessary materials such as p-xylol and naphthalene, are either available in too small a quantity or used in other branches of production where they are irreplaceable. The main raw material, dimethylterephthalate (DMT), can be produced from a diversity of materials.

Raw materials for the fibre's production will be produced by VEB Chemische Werke Buna and VEB Leuna-Werke 'Walter Ulbricht,' and the fibre itself by VEB Thünngisches Kunstfaserwerk 'Wilhelm Pieck', of Schwarza, and VEB Kunstseidenwerk 'Friedrich Engels', of Premnitz. Research work is still being carried out into the properties of Lanon.

Preparations for large-scale production will start this year with the bringing into operation at Chemische Werke Buna of a plant producing 10 tonnes monthly of DMT on phthalic anhydride basis, and a smaller plant working on a diethylbenzole basis, of experimental Lanon production plants at Schwarza and of experimental plant at Premnitz and elsewhere. A first model of the plant is being planned in co-operation with Russian scientists.

Four Countries Seek Drug Plants in Thailand

Dumex of Denmark, who in co-operation with the East Asiatic Co. have established a Thai company, have now completed plans to set up a pharmaceuticals plant employing several hundred. Merck Sharp and Dohme International, whose application to the Thai Government has been approved, propose to produce antibiotics, steroids, diuretics, vitamins, etc., in Thailand. Two other applications to establish pharmaceutical plants—one British, one Japanese—are also being considered.

New Dioxane Derivatives from Chemische Werke Huls

The following dioxane derivatives are now obtainable in laboratory quantities from Chemische Werke Hüls A.G., Marl, West Germany: 4-methyl-dioxane, boiling point$_{760}$ 114°C; 2.4-dimethyl-dioxane b.p.$_{760}$ 120°C; 4-n-propyl-5-ethyl-dioxane, b.p.$_{760}$ 196°C; 4-phenyl-dioxane b.p.$_{760}$ 245°C. All these are colourless liquids, soluble in organic solvents and insoluble in water. Also obtainable is 4-methyl-4-phenyl-dioxane, freezing point 35-40°C; this consists of white crystals which are also soluble in inorganic solvents and insoluble in water.

Dutch Patent on Plastics Coating to Protect Foods

A method of protecting foods such as meat, cheese and butter from the air is described in Netherlands Patent Application 205,232.

A coating is obtained by applying an aqueous dispersion of a synthetic resin, preferably polyvinyl acetate, which is plasticised by a dispersion of pectin in glyceryl triacetate. The coating remains stable at temperatures below 0°C if illipe oil is incorporated in the glyceryl triacetate. A suitable plasticiser contains three parts of citrus pectin, 65 parts glyceryl triacetate, 20 parts glycerol, two parts 6% carboxymethylcellulose and 10 parts illipe oil.

Balanced Supply-Demand Pattern for U.S. Selenium

Selenium industry in the U.S. showed a return to a balanced supply-demand pattern in 1958 after a decade of scarcity and later of overproduction, the U.S. Department of the Interior reports in a preliminary 1958 survey on the industry. A sharp drop in production was responsible for reversing the trend and resulted in shipments exceeding production by a substantial margin during the year. Producers stocks also showed a decline.

Production of selenium decreased 37% from 1,077,000 lb. in 1957 to an estimated 682,000 lb. in 1958. Producers' shipments are estimated at 734,000 lb. in 1958, as compared to 624,500 lb. for the previous year, an increase of 18%. Producers' stocks dropped 82,000 lb. to an estimated 569,000 lb. at the end of the year.

The price quoted for selenium was lowered on 19 February 1958 to $7.00 per lb. for commercial quality and $9.50 per lb. for high-purity grade, a decrease of $0.50 and $1.00 a lb. respectively. These prices were maintained throughout the year.

Estimated imports are higher than 1957 and exports continued to be negligible. Imports were obtained mainly from Canada (92,935 lb.), Japan (28,981 lb.), and West Germany (4,938 lb.) (Total of 126,854 lb. for first 9 months, or at projected annual rate of about 166,000 lb. compared with 147,400 lb. in 1957.) Other selenium imports were from Mexico and Rhodesia-Nyasaland.

West Germany Imports more Isotopes

The import of isotopes into Western Germany, where none are at present manufactured, is growing at a remarkable rate, figures issued by the country's Ministry for Atomic Energy and Water Supply show. In the first half of last year isotopes with a total power of 4,559 curies were imported, as against a figure for the whole of 1957 of 4,444 curies. The U.K. was the most important exporter to West Germany, followed by the U.S., Canada and Holland. In value the import of isotopes rose from DM 549,000 (about £45,750) in 1956 to to DM 682,000 (about £56,833) in 1957 and DM 503,000 (about £41,910) in the first half of last year. The number of consumers in the country rose from 557 in 1957 to 663 in the first half of last year—250 industrial users and 413 medical and other institutes.

Fertilisers and Chemicals are Doubling Haifa Capacity For Nitrogen

AN extension programme now in hand by Fertilisers and Chemicals Ltd., Haifa, will double nitrogen production facilities and provide liquid and compound granulated fertilisers. Capital expenditure, the annual report for 1958 states, will be of the order of I£12 million and will be financed by a Government loan of I£6 million and an investment by the Government of a further I£6 million in shares.

Fertilisers and Chemicals have also embarked on a programme of diversification. Since the close of 1958, the sodium tripolyphosphate plant has started production. A dry ice plant which should be ready this year has been ordered from Germany and control of the Kadimah Chemical Corp. has been acquired.

The company state that they hope to profit from the acquisition by virtue of the extensive research carried out by the Kadimah company in the petrochemicals field.

As domestic demands for nitrogenous fertilisers are forecast to exceed in the year 1960-61 the present designed capacity of the plant by 65%, it is planned to increase the output of ammonia to 20,000 tons a year by 1960, and to raise this quantity subsequently up to 26,000 tons. A partial oxidation plant is therefore under construction which will supply additional raw materials required for an increased output of ammonia.

It is also planned to initiate the production of liquid fertilisers in higher concentrations and of compound and concentrated fertilisers. Ancillary facilities such as steam, boiler water, cooling water and power supply will be expanded to this end. By-product of ammonia manufacture, carbon dioxide, will be used as raw material in the dry ice plant.

Work on sites began in April 1958, equipment will be installed in the last quarter of the current year and it is hoped to run-in the new plants before the end of 1959. The nitric acid plant is now being commissioned. In nearly all divisions production has been expanded up to an average of 60% above designed capacity, and labour input per ton of product has been reduced by 39%. Sales rose by nearly 50% over the previous year. Turnover went up from I£13 million in 1956/57 to over I£20 million. Exports account for 10% of the annual sales, the margin left over after the steadily growing domestic demand has been met. Total investment in the additional equipment ordered for production of nitrogenous fertilisers, granulated fertilisers and service equipment will total I£11.75 million—including DM 11.5 million for equipment purchases.

Several projects for utilisation of waste and by-products have been started in an endeavour to diversify output and improve ratios of investment to turnover and of output to overheads. The services of the engineering division have been used for such outside projects as the expansion of the Dead Sea potash facilities. Also engineering 'know-how' for construction of a dicalcium phosphate plant has been sold to the Krebs Co. of Paris.

Exports were again restricted by growing domestic requirements. Products exported included ammonium sulphate and potassium sulphate.

Increases in production in 1957/58 compared with previous year were:

Product	% *increase*
Sulphuric acid	28.4
Superphosphate	10.5
Dicalcium phosphate	133.3
Potassium sulphate	117.1
Ammonia	52.4
Ammonium sulphate	51.7

A.E.A. Industrial Group to be Formed into Two New Groups

CHANGES in the organisation of the U.K. Atomic Energy Authority to be effective from 1 July 1959, have been announced.

Hitherto the Authority has been made up of three groups: the Research Group, the Weapons Group and the Industrial Group. The Industrial Group, which has become too large for convenient management, will now be divided into two: the Development and Engineering Group; and the Production Group.

At the same time the full-time technical members of the Authority will again assume executive responsibility for particular groups, in addition to their functional responsibilities and general duties as members of the board.

Sir William Cook, with the title of Member for Development and Engineering, will be executive head of the Development and Engineering Group and will in addition retain corresponding functional responsibilities throughout the Authority.

Sir Leonard Owen will have the title of Member for Production (Designate) and will be the executive head of the Production Group.

Sir William Penney, whose appointment to succeed Sir John Cockcroft as the Member for Scientific Research, has already been announced, will in addition become the executive head of the Research Group, while retaining his functional responsibilities for scientific research throughout the Authority. The appointment of a successor to Sir William Penney as Member for Weapons Research and Development will be announced later.

Nitra-Shell Now Sold For Gardeners

THE nitrogenous fertiliser, Nitra-Shell which has proved its efficiency with the farming community over the last two years, is now being introduced by Shell Chemical Co. Ltd. in small polythene packs for use in the garden. Nitra-Shell contains 20.5% nitrogen and 36% carbonate of lime. The nitrogen and lime are carefully balanced to enable the product to be used on all types of soil.

The introduction of 4% malathion dust to their range of garden chemicals is also announced by Shell Chemical. This material gives a rapid kill to aphids such as greenfly and blackfly on vegetable crops and flowers.

Open Days of Water Pollution Research Laboratory

The D.S.I.R. Water Pollution Research Laboratory will hold its first open days on 6 and 7 May, when the work of the laboratory will be on view to those interested in the treatment of sewage and industrial waste waters and the control of pollution of natural waters. Applications for invitations to visit the laboratories should be sent to the director at Elder Way, Stevenage, Herts, not later than 30 April.

British Firm Develops Europe's Largest Foam-making Machine

A NEW super-machine—claimed to be the largest in Europe—for making plastic foam, went into full production last week at Aeropreen Products Ltd., Lindsay Avenue, High Wycombe, Bucks. It is the only equipment in Britain able to mass-produce polyether foam and the company has already despatched its first export consignment to West Germany.

Quantity production of polyether foam by Aeropreen will speed up the massive changeover to flexible foams for all types of upholstery and many other applications. Four tons of the foam can be made in one hour.

To cope with demand, which is reported to have increased at least tenfold in the past two years, Aeropreen recently moved into a larger 61,000 sq. ft. factory at High Wycombe. Mr. R. D. Millar, managing director of Aeropreen, reports that current U.S. production is at a rate of 10,000 tons of plastic foam a year and this is expected to be trebled within twelve months.

Using a still-confidential process, Aeropreen can 'dome' squabs of polyether. Processes under active development by the company mean that domes far higher than 1 inch and of much more complex shape, will soon be available to customer's choice. This will present the furniture industry with some very interesting new design possibilities.

The new foaming plant was designed by the company. Its large size is stated to be an advantage in itself because larger units of foam can be made. Wastage is eliminated and costs cut. The machine is producing slabs up to 54 in wide, and 18 in. deep.

Before the foaming plant became operative problems were tackled on a small pilot unit erected in the company's laboratory. Samples from both the pilot plant and the production equipment have been rigorously tested. A cushion of polyether, four inches deep, received 90,000 blows each of which was the equivalent of a 12-stone man falling into a chair. Result: a small depression ¼ of an inch deep.

Polyether Aeropreen prepolymer 16 has a density of 1.98-2.2 lb. per cu. ft.; a hardness figure of 25.0; tensile strength of 14-17 lb. sq. in.; elongation at break, 200%; compression set, 22 hours at room temperature 3-4%; compression set, 22 hours at 70°C, 10%; physical properties after 5 days humidity-ageing at 83°C, 100%; thermal conductivity, 0.26; safe dry temperature, 275°F.

The following qualities are common to all Aeropreen foams, including polyether: they can be washed, boiled, dry-cleaned, sterilised; they are unaffected by seawater, detergents, disinfectant, urine or perspiration and they resist greases, oils, fuels and many acids.

'Unique' Portable Deionisation Plant Produces Chemically Pure Water

A SELF-CONTAINED portable deionisation plant for the production of chemical pure water was recently delivered by John Thompson-Kennicott Co., Wolverhampton, to the Berkeley Nuclear Power Station. The plant is said to be unique because it can be taken anywhere for immediate connection to the existing water supply.

It was designed and made by the company to treat between 1,500 and 2,000 gall. of water an hour. Water thus treated is claimed to be the equivalent of, or better than, triple-distilled water, the final water from the unit having a resistance greater than 2 million ohm.

The portable deionisation plant leaving the Wolverhampton works for Berkeley

At Berkeley, the plant will produce the chemically pure water that is required for the testing and the initial operation of the 16 heat exchangers. Later, it will be available for use on any nuclear or thermal power station where water of high quality is needed for testing and commissioning purposes.

The Berkeley station is being built by the A.E.I.-John Thompson Nuclear Energy Co.

Plastics Institute to Hold Meeting on Polymeric Progress

A two-day conference on 'Polymeric progress' will be held by the Plastics Institute in the William Beveridge Hall of London University on 30 and 31 March 1960. The first day's proceedings will open with a one-hour paper on 'New polymers: new problems' by Professor H. F. Mark from the Polytechnic Institute of Brooklyn. The remainder of the first day will be devoted to materials and the second day will be concerned with methods—present and future methods of polymerisation.

PEOPLE in the news

● DR. T. W. GOODWIN has been appointed to the chair of agricultural chemistry University College of Wales, Aberystwyth, in succession to PROFESSOR R. O. DAVIES, who retires at the end of the present session. Dr. Goodwin, who is 42, is a graduate of Liverpool University, where he obtained the degrees of M.Sc. in 1939 and D.Sc. in 1952.

● MR. T. MERVYN JONES, chairman of the Wales Gas Board, has been installed as president of the Industrial Association of Wales and Monmouthshire. The new vice-president is MR. J. A. JOHNSON, manager of Courtaulds at Holywell, Flintshire. Two junior vice-president have also been installed, DR. A. G. RAMSAY, resident director of Mond Nickel Co. at Clydach, Swansea, for South Wales and MAJOR A. S. D. GRAESSER, joint managing director of R. Graesser for North Wales.

● DR. S. H. JENKINS, chief chemist of the Birmingham, Tame and Rea District Drainage Board, Rookery Park, Birmingham 24, has been elected chairman of the Midlands Section, Society for Analytical Chemistry, at the recent annual meeting. DR. H. C. SMITH, vice-principal, Coventry Technical College, is vice-chairman and MR. G. W. CHERRY (West Midland Gas Board), of 48 George Frederick Road, Sutton Coldfield, is hon. secretary. Hon. treasurer is MR. F. C. J. POULTON and hon. assistant secretary is MR. R. ADKINS.

Dr. J. A. Berriman, who as stated in 'People in the News,' 14 March, has been appointed general manager of the Carrington Works of Petrochemicals Ltd. in succession to Mr. W. E. Huggett

● MR. J. POLLOCK, sales manager of Mark Anthony and Sons Ltd., polythene printers and converters, Chalk Hill, Watford, Herts, has been appointed to the board of the company with specific responsibility for the sales division.

● MR. J. A. EGGLESTON, B.Sc., F.R.I.C., head of the standards laboratory at the Airdree factory of Boots Pure Drug Co. Ltd. since that works was opened, ten years ago, will retire on 1 April. A Nottingham man, Mr. Eggleston joined the company in 1915 as a laboratory assistant before wartime service in the South Notts. Hussars and the Tank Corps. He returned as laboratory assistant in 1919 and after evening studies graduated B.Sc.(hons) London in 1923. A section head in the analytical department at Nottingham he moved to Beeston in a similar position before being promoted to Airdree in 1949. During his stay in Scotland Mr. Eggleston served on the Glasgow and West of Scotland S.C.I. committee and had been its representative on the Fine Chemicals group. He was also on the committee of the Methods of Analyses Panel (Glasgow) and a member of the Chemical Society and the Royal Statistical Society. He was hon. secretary and treasurer of the Scottish Section, Society for Analytical Chemistry for the past eight years, until the recent annual meeting. He was secretary of the St. Andrews' Congress on Modern Analytical Chemistry in Industry in 1957. Mr. Eggleston's successor at the Airdree works will be MR. J. W. MURFIN.

● MR. L. B. RYDER, chairman of the I.C.I. Lime Division, and MR. A. G. C. HEAD, deputy chairman of International Chemical Co. Ltd., sailed from Southampton in the *Queen Mary* for New York on 19 March.

● DR. L. ESSEN, O.B.E., D.Sc., Ph.D., a senior principal scientific officer, at the National Physical Laboratory, has received a cheque for £500. This is the first of 10 annual awards for the research worker who is considered by D.S.I.R. to have made an outstanding contribution to the research work of the department during the previous year. Dr. Essen was selected for his work on the establishment of a caesium frequency standard as a basis for the future standard of time.

Alan Sanderson, who has been appointed sales manager of Blaw Knox Chemical Engineering Co. Ltd., 20 Eastbourne Terrace, London W.2, with immediate effect, is experienced in the process plant industry

● MR. J. S. BROUGH, M.I.Chem.E., M.I.Mech.E., F.Inst.Pet., has joined Humphreys and Glasgow, Ltd., London S.W.1, from Monsanto Chemicals, Ltd. where he was general manager of production. As technical director and general manager, he will act as deputy to MR. G. G. FARTHING, deputy chairman and managing director of Humphreys and Glasgow. An associate of the Manchester College of Technology, Mr. Brough will shortly complete a three-year term as a member of council of the Institution of Chemical Engineers and is chairman of Group A, British Conference on Automation and Computation. During the war he was with Magnesium Elektron Ltd., as plant manager. After the war he joined Monsanto and became chief chemical engineer at Ruabon. In the spring of 1950 he was appointed chief engineer of Monsanto and six years later general manager of production.

● At the annual meeting of the British Industrial Measuring and Control Apparatus Manufacturers' Association, MR. W. G. THOMAS (Bailey Meters and Controls Ltd.) was elected as president and MR. V. D. MACLACHLAN (Honeywell Controls Ltd.) was elected chairman.

● MR. A. N. HARROW, newly elected chairman of the Scottish section, Society for Analytical Chemistry, joined Bilsland Brothers Ltd., 75 Hydepark Street, Glasgow, in 1924 and not 1955 as stated in 'People in the News', 12 March.

● MR. A. A. HAINING has been appointed sales manager of Exactor Ltd., Exactor Works, Church Way, Edgware, Middx. Formerly deputy sales manager of Sigmund Pumps Ltd. he took up his duties with Exactor on 16 March.

● New chairman of Wm. Butler and Co. (Bristol) is MR. ERIC W. BUTLER who has succeeded his brother DR. T. HOWARD BUTLER. Dr. Butler, who has been chairman since 1935, has retired from the board. He is 72. MR. E. PETER BUTLER, former joint managing director, has become vice-chairman, and his fellow joint managing director, Mr. T. Cyril Butler, sole managing director.

● MR. H. G. HERRINGTON, managing director of High Duty Alloys, has been elected chairman of the Aluminium Development Council for a third term of office.

● MR. CHARLES H. GLASSEY, managing director, British Industrial Plastics Ltd.), was elected president of the British Plastics Federation in succession to MR. H. V. POTTER (Bakelite Ltd.) at the annual meeting last week. MR. N. B. PUNFIELD (Punfield and Barstow (Mouldings) Ltd.) was elected chairman and MR. D. RADFORD (Ekco Plastics Ltd.) vice-chairman. Immediate past-chairman is MR. C. C. LAST (Bakelite Ltd.) and MR. R. P. ANDERSON (Ebonestos Ltd.) is hon. treasurer.

● MR. NEILL GIBSON BENNETT has been elected a joint managing director of the Graviner Manufacturing Co. Ltd., 29 St. James's Street, London S.W.1.

● MR. D. F. HAYDON, chief technical sales representative of Baird and Tatlock (London) Ltd., and Hopkin and Williams Ltd., is making a six-week tour in the Middle East, having left England on 17

(*Continued on page* 550)

Commercial News

- **A. and W. Trading Profit Up by £634,000**
- **Monsanto Chemicals Net Profit Lower**
- **Nitrogen Market Unfavourable—Ruhrchemie**
- **Sasol Expect First Profit This Year**

Albright and Wilson

Trading profit of Albright and Wilson for 1958, after deducting all charges except depreciation, was £5,388,000 (£4,754,000). Depreciation amounted to £2,059,000 (£1,847,000) and profit before tax was £3,329,000 (£2,907,000). Tax amounted to £1,606,000 (£1,295,000) and it is stated that proportion of profit taken by tax in 1957 was abnormally low because of tax allowances, the benefit from which was largely confined to that year. Profit after tax was £1,723,000 (£1,612,000) and profit attributable to stockholders was £1,652,000 (£1,957,000).

A second interim of 13% is proposed on ordinary and will be recommended as a final dividend, making 17% for the year. The 1957 payment was equivalent to 16% on the present capital.

Henry Balfour and Co.

Group net profit of Henry Balfour and Co. Ltd., gas and chemical engineers, for the year to 31 October 1958, was £75,013 (£47,739). A dividend of 17% (16½%) is being paid. Commitments total £16,303 (£22,516), current assets are £1,107,661 (£1,034,483), liabilities are £610,857 (£537,181) and there is an overdraft of £204,218 (£207,822).

British Filters

Half of the ordinary shares in British Filters Ltd., of Maidenhead, specialists in finer filtration, have been purchased by Tecalemit; automotive and industrial lubrication engineers. Mr. S. G. Gates, chairman and Mr. P. R. Scutt, managing director of Tecalemit, will join the board of British Filters. Mr. T. C. Worth, present chairman and technical director of British Filters, will continue in that capacity, together with Mr. N. J. Bennett, who will continue as managing director.

Monsanto Chemicals

Turnover of Monsanto Chemicals Ltd. for 1958 was stated by chairman, Sir Miles Thomas, to be well sustained at £15,462,633, compared with the record figure of £15,683,272 for 1957. Direct exports at a net total of £5,429,222 were 35% of total sales as compared with £6,416,209 (41%) for 1957. After charging £842,202 for depreciation and obsolescence, an increase of £113,938 over 1957, and debenture interest of £328,750, an increase of £140,750 over 1957, net profit before taxation in 1958 amounted to £1,314,949, compared with £1,706,554 for 1957. Net profit after taxation was £629,564 compared with £864,374 for the year 1957. The decline in profits was due to reduced profit margins, initially high operating costs of new and expanded plants brought into production and to the marked reduction in export sales turnover. An increase in turnover is expected this year, but the relative profit position will be subject to the factors encountered last year.

Expenditure on capital projects during 1958 amounted to £3,461,106 and at the year-end outstanding commitments totalled approximately £1,965,000 (£1.65 million).

The year's dividend has been repeated at 13½%.

Sir Miles reported that the greatest single effort in the expansion of the company's operations at the present time was concentrated at Fawley, where rapid progress in the building of the polythene plant is reported. Production of polythene should begin early this year and is expected to make an increasing contribution to the company's operations during the year. Capital expenditure to date amounted to £3 million.

Comparison with prices for a hundred of Monsanto's most important raw materials in 1958 as against 1953 showed that 34 had decreased in price 51 had increased by amounts up to 20% and 15 by amounts up to 50%.

Trade in the company's basic products had been "encouragingly progressive." Sales of aspirin were greater than in the preceding year. The intention to expand production facilities for aspirin and phenacetin and also of their intermediates, salicylic acid and paraphenetidine, has already been reported. New grades of styrene plastics which had been developed were noted as being "increasingly in demand." Progress with the new Tred synthetic rubber materials was slow. Textile chemicals and dielectric fluids had experienced ups and downs in common with the industries in which they were used.

In the phthalic and maleic anhydrides field, Monsanto, states Sir Miles, have every intention of consolidating their dominant position as manufacturers of these materials.

The total number of employees at the end of 1958 was 4,283 compared with 4,084 in 1957.

Ruhrchemie AG

Ruhrchemie AG, of Oberhausen-Holten, West Germany, realised a final profit of only DM42,000 (about £3,500) in 1957/58, as against DM2,430,000 (about £202,500) on a share capital of as much as DM60,000,000 (£5,000,000). The current year is stated to be "not without troubles" by the company due to the unfavourable development in the nitrogen fertiliser market and refinery products; economy and rationalisation measures have therefore been introduced.

The company's board has said repeatedly in recent months that the Ruhrchemie production programme is to be changed drastically.

Shawinigan Chemicals

Dividend received by Shawinigan Chemicals, Montreal, from Shawinigan Ltd., London, during 1958 totalled $60,954 ($60,584). The annual report states that Hedon Chemicals Ltd., owned jointly with the Distillers Co. Ltd., and which makes vinyl acetate in a plant near Hull, has as yet paid no dividends. Operations, however, became profitable in the year ended 30 September 1958.

Sasol

Sasol—the oil-from-coal project in the Free State, South Africa, is expected to show its first profit this year, Dr. Diedrichs, Minister of Economic Affairs, has announced. The expectation was that this year there would be a profit of more than £500,000.

Cash losses suffered by Sasol have been gradually reduced. In 1956 the loss was £3,395,000 and last year, the figure was £500,000. In the third quarter of last year 177,000 gall. petrol had been produced and in the fourth quarter 254,000 gall. Other petroleum products had increased from 4.8 million to 7.3 million gall. The market value of Sasol products had risen from £914,000 to £1,330,000 for these quarters.

Olin Mathieson

Consolidated net sales and operating revenues in 1958 of Olin Mathieson Chemical Corporation, U.S., were virtually unchanged at $601,398,000, compared with $592,877,000 in 1957. Net income, however, was drastically reduced by writing-off a large number of non-recurring and unusual charges which occurred principally because of the corporation's very large expansion programme. Net profit was $9,383,000, or $.70 per share ($36,377,000, or $2.70 per share).

During the year the final phases of internal adjustment were reached following the period of rapid growth of prior years. Activities formerly conducted by 17 domestic operating units were consolidated into six major industrial divisions: chemicals, energy, metals, packaging, pharmaceuticals, and sporting arms and ammunition, with a seventh division conducting all overseas operations.

INCREASE OF CAPITAL

F. D. Copeland and Sons Ltd., essential oil dealers, etc., 115 Grays Inn Road, London W.C.1. Increased by £2,500 beyond the registered capital of £10,000.

BRITISH CHEMICAL PRICES

GENERAL CHEMICALS

Acetic Acid. D/d in ret. barrels (tech. acid barrels free); in glass carboys, £8; demijohns, £12 extra. 80% tech., 10 tons, £97; 80% pure, 10 tons, £103; commercial glacial, 10 tons, £106.

Acetic Anhydride. Ton lots d/d, £128.

Alum. Ground, f.o.r., about £25.
MANCHESTER: Ground, £25.

Aluminium Sulphate. Ex-works, d/d, £15 10s to £18.
MANCHESTER: £16 to £18.

Ammonia, Anhydrous. Per lb., 1s 9d-2s 3d.

Ammonium Chloride. Per ton lot, in non-ret. pack, £33 2s 6d.

Ammonium Nitrate. D/d, 4-ton lots, £31.

Ammonium Persulphate. Per cwt., in 1-cwt. lots, d/d, £6 13s 6d; per ton, in min. 1-ton lots, d/d, £123 10s.

Ammonium Phosphate. Mono-and di-, ton lots, d/d, £106 and £97 10s.

Antimony Sulphide. Per lb., d/d UK in min. 1-ton lots: crimson, 4s 9½d d/d to 5s 2½d; golden, 3s ½d d/d per lb. to 4s 5½d d/d.

Arsenic. Ex-store, £45 to £50.

Barium Carbonate. Precip., d/d, 4-ton lots, bag packing, £41.

Barium Chloride. 2-ton lots, £49.

Barium Sulphate [**Dry Blanc Fixe**]. Precip. 2-ton lots, d/d, £43.

Bleaching Powder. Ret. casks, c.p. station, in 4-ton lots. £30 7s 6d.

Borax. Ton lots, in hessian sacks, c.p. Tech., anhydrous, £68; gran., £46; crystal, £48 10s; powder, £49 10s; extra fine powder, £50 10s; BP, gran., £55 10s; crystal, £57 10s; powder, £58 10s; extra fine powder, £59 10s. Most grades in 6-ply paper bags. £1 less.

Boric Acid. Ton lots, on hessian sacks, c.p. Tech., gran., £76 10s; crystal, £84 10s; powder, £82; extra fine powder £84; BP gran., £89 10s; crystal, £96 10s; powder, £94; extra fine powder, £96. Most grades in 6-ply paper bags, £1 less.

Calcium Chloride. Ton lots, in non-ret. pack; solid and flake, about £15.

Chlorine, Liquid. In ret. 16-17 cwt. drums d/d in 3-drum lots, £41.

Chromic Acid. Less 2½%, d/d UK, in 1-ton lots, per lb., 2s 2½d.

Chromium Sulphate, Basic. Crystals, d/d, per lb., 8½d; per ton, £79 6s 8d.

Citric Acid. 1-cwt. lots, per cwt., £11 5s. 5 cwt. lots per cwt. £11; packed in jute bags or five ply paper bags, both with polythene liners, 1 cwt. lots, per cwt. £10 17s; 5 cwt. lots per cwt. £10 12s.

Cobalt Oxide. Black, per lb., d/d, bulk quantities, 13s 2d.

Copper Carbonate. Per lb., 2s 3d.

Copper Sulphate. F.o.b., less 2% in 2-cwt. bags, £79.

Cream of Tartar. 100%, per cwt., about £11 12s.

Formaldehyde. In casks, d/d, £39 10s.

Formic Acid. 85%, in 4-ton lots, c.p., £91.

Glycerine. Chem. pure, double distilled 1.2627 s.g., per cwt., in 5-cwt. drums for annual purchases of over 5-ton lots and under 25 tons, £11 1s 6d. Refined technical grade industrial, 5s per cwt. less than chem. pure.

Hydrochloric Acid. Spot, per carboy, d/d (according to purity, strength and locality), about 12s.

Hydrofluoric Acid. 60%, per lb., about 1s 2d.

Hydrogen Peroxide. Carboys extra and ret. 27.5% wt., £119 0s 0d; 35% wt., d/d, £143.

Iodine. Resublimed BP, under 1 cwt., per lb., 14s 1d; for 1-cwt. lots, per lb., 13s 2d; 5 cwt., per lb., 12s 8d.

These prices are checked with the manufacturers, but in many cases there are variations according to quality, quantity, place of delivery, etc. Abbreviations: d/d, delivered; c.p., carriage paid; ret., returnable; non-ret. pack., non-returnable packaging; tech., technical; comm., commercial; gran., granular.

All prices per ton unless otherwise stated

Iodoform. Under 1 cwt., per lb., £1 2s 4d, for 1-cwt. lots, per lb., £1 1s 8d, 5 cwt., per lb., 21s 1d, crystals, 3s more.

Lactic Acid. Pale tech., 44% by wt., per lb., 14d; dark tech., 44% by wt., per lb., 9d; chem. quality, 44% by wt., per lb., 12½d; 1-ton lots, ex-works, usual container terms.

Lead Acetate. White, about £154.

Lead Nitrate. 1-ton lots, about £135.

Lead, Red. Basis prices: Genuine dry red, £104 5s; orange lead, £116 5s. Ground in oil: red, £125 5s, orange, £137 5s.

Lead, White. Basis prices: Dry English in 5-cwt. casks, £116; Ground in oil: English, 1-cwt. lots, per cwt., 194s.

Lime Acetate. Brown, ton lots, d/d, £40; grey, 80-82%, ton lots, d/d, £45.

Litharge. In 5-ton lots, £106 5s.

Magnesite. Calcined, in bags, ex-works, about £21.

Magnesium Carbonate. Light, comm., d/d, 2-ton lots, £84 10s under 2 tons, £97.

Magnesium Chloride. Solid (ex-wharf), £17 10s.

Magnesium Oxide. Light, comm., d/d, under 1-ton lots, £245.

Magnesium Sulphate. Crystals, £16.

Mercuric Chloride. Tech. powder, per lb., for 5-cwt. lots, in 28-lb. parcels, £1 1s 9d; smaller quantities dearer.

Mercury Sulphide, Red. 5-cwt. lots in 28-lb. parcels, per lb., £1 10s. 6d.

Nickel Sulphate. D/d, buyers UK, nominal, £170.

Nitric Acid. 80° Tw., £35 2s.

Oxalic Acid. Home manufacture, min. 4-ton lots, in 5-cwt. casks, c.p., about £132.

Phosphoric Acid. Tech. (s.g. 1.700) ton lots, c.p., £100; BP (s.g. 1.750), ton lots, c.p., per lb., 1s 4d.

Potash, Caustic. Solid, 1-ton lots, £95 10s; liquid, £36 15s.

Potassium Carbonate. Calcined, 96/98%, 1-ton lots, ex-store, about £74 10s.

Potassium Chloride. Industrial, 96%, 1-ton lots, about £24.

Potassium Dichromate. Gran., per lb., in 5-cwt. to 1-ton lots, d/d UK, 1s 2½d.

Potassium Iodide. BP, under 1-cwt., per lb., 8s; per lb. for 1-cwt. lots, 7s 3d.

Potassium Nitrate. 4-ton lots, in non-ret. pack, c.p., £63 10s.

Potassium Permanganate. BP, 1-cwt. lots, per lb., 1s 11½d; 3-cwt. lots, per lb., 1s 10¾d; 5-cwt. lots, per lb., 1s 10½d; 1-ton lots, per lb., 1s 10d; 5-ton lots, per lb., 1s 9½d. Tech., 5-cwt. in 1-cwt. drums, per cwt., £9 15s 6d; 1-cwt. lots, £10 4s 6d.

Salammoniac. Ton lot, in non-ret. pack, £47 10s.

Salicylic Acid. MANCHESTER: Tech., d/d, per lb., 2s 6½d, 1-ton lots.

Soda Ash. 58% ex-depot or d/d, London station, 1-ton lots, about £17 3s.

Soda, Caustic. Solid 76/77%: spot, d/d 1-ton lots, £33 16s 6d.

Sodium Acetate. Comm. crystals, d/d, £91.

Sodium Bicarbonate. Ton lot, in non-ret. pack, £21 10s.

Sodium Bisulphite. Powder, 60/62%, d/d 2-ton lots for home trade, £46 2s 6d.

Sodium Carbonate Monohydrate. Ton lot, in non-ret. pack, c.p., £64.

Sodium Chlorate. 1-cwt. drums, c.p. station, in 4-ton lots, about £88 10s.

Sodium Cyanide. 96/98%, ton lot in 1-cwt. drums, £126.

Sodium Dichromate. Fine Crystals per lb., 1s. Net d/d UK, anhydrous, per lb., 1s 1¼d. Net. del. d/d UK, 5-cwt. to 1-ton lots.

Sodium Fluoride. D/d, 1-ton lots and over, per cwt., £5; 1-cwt. lots, per cwt., £5 10s.

Sodium Hyposulphite. Pea crystals, £38; comm., 1-ton lots, c.p., £34 15s.

Sodium Iodide. BP, under 1 cwt., per lb., 13s; 1-cwt. lots, per lb., 12s 9d; 5 cwt., per lb., 12s 3d.

Sodium Metaphosphate [**Calgon**]. Flaked, paper sacks, £133.

Sodium Metasilicate. (Spot prices) D/d UK in 1-ton lots, 1-cwt. free paper bags, £29.

Sodium Nitrate. Chilean refined gran. over 98%, 6-ton lots, d/d c.p., per ton £29.

Sodium Nitrite. 4-ton lots, £32.

Sodium Perborate. (10%0) in 1-cwt. free kegs, cwt. lots, £139 5s.

Sodium Percarbonate. 12½% available oxygen, in 1-cwt. kegs, £170 15s.

Sodium Phosphate. D/d, ton lots: di-sodium, crystalline, £40 10s, anhydrous, £88; tri-sodium, crystalline, £39 10s, anhydrous, £86.

Sodium Silicate. (Spot prices) 75-84° Tw. Lancs and Ches., 6-ton lots, d/d station in loaned drums, £12 10s; Dorset, Somerset and Devon, per ton extra, £3 5s; Scotland and S. Wales, extra, £2 17s 6d. Elsewhere in England, not Cornwall, extra, £1.

Sodium Sulphate [**Desiccated Glauber's Salt**]. D/d in bags, about £20.

Sodium Sulphate [**Glauber's Salt**]. D/d, up to £18 10s.

Sodium Sulphate [**Salt Cake**]. Unground, d/d station in bulk, £10.
MANCHESTER: d/d station, £10 10s.

Sodium Sulphide. Solid, 60/62%, spot, d/d, in drums in 1-ton lots, £36 2s 6d; broken, d/d, in drums in 1-ton lots, £37 2s 6d.

Sodium Sulphite. Anhydrous, £71 10s; comm., d/d station in bags, £27-£28 10s.

Sulphur. 4 tons or more, ground, according to fineness, £20-£22.

Sulphuric Acid. Net, naked at works, 168° Tw. according to quality, £10-£11 12s 6d; 140° Tw., arsenic free, £8 7s 6d; 140° Tw., arsenious, £8 2s 6d.

Tartaric Acid. Per cwt.: 10 cwt. or more, £14 10s; 1 cwt., £14 15s.

Titanium Oxide. Standard grade comm., rutile structure, £178; standard grade comm., anatase structure, £163.

Zinc Oxide. Max. for 2-ton lots, d/d, white seal, £100 10s; green seal, £98 10s; red seal, £95 10s.

SOLVENTS AND PLASTICISERS

Acetone. All d/d. In 5-gal. drums, £128; in 10-gal. drums, £118; in 40-45 gal. drums, under 1 ton, £93; 1-5 tons, £90; 5-10 tons, £89; 10 tons and up, £88; in 400-gal. tank wagons, £85.

Butyl Acetate BSS. 10-ton lots, £173.

***n*-Butyl Alcohol BSS.** 10 tons, in drums, d/d, £149.

***sec*-Butyl Alcohol.** All d/d. In 5-gal. drums, £168; in 10-gal. drums, £158; in 40-45 gal. drums, under 1 ton, £133; 1-5 tons, £130; 5-10 tons, £129; 10 tons and up, £128; in 400-gal. tank wagons, £125.

tert-**Butyl Alcohol.** 5-gal. drums, £195 10s; 40/45-gal. drums: 1 ton, £175 10s; 1-5 tons, £174 10s; 5-10 tons, £173 10s; 10 tons and up, £172 10s.
Diacetone Alcohol. Small lots: 5-gal. drums, £185; 10-gal. drums, £175. 40/45-gal. drums: under 1 ton, £148; 1-5 tons, £147; 5-10 tons, £146; 10 tons and over, £145, in 400 gal. tank wagons, £142.
Dibutyl Phthalate. In drums, 10 tons, d/d, per ton, £210; 45-gal. drums, d/d, 1-4 drums, £216.
Diethyl Phthalate. In drums, 10 tons, per ton, £187 10s; 45-gal. drums, d/d, 1-4 drums, £193 10s.
Dimethyl Phthalate. In drums, 10 tons, per ton, d/d, £179, 45-gal. drums, d/d, per ton £185.
Dioctyl Phthalate. In drums, 10 tons, d/d, per ton £284; 45-gal. drums, d/d, per ton, £290.
Ether BSS. 1-ton lots, drums extra, per lb., 1s 11d.
Ethyl Acetate. 10-ton lots, d/d, £145.
Ethyl Alcohol [PB 66 o.p.]. Over 300,000 p. gal. 4s 0½d; d/d in tankers, 2,500-10,000 p. gal. per p. gal., 4s 2¾d. D/d in 40/45-gal. drums, p.p.g. extra, 1d. Absolute alcohol (75.2 o.p.), p.p.g. extra, 5d.
Methanol. Pure synthetic, d/d, £43 15s.
Methylated Spirit. Industrial 66° o.p.: 500-gal. and up, d/d in tankers, per gal., 5s 10½d; 100-499 gal. in drums, d/d, per gal., 6s 3d-6s 5d. Pyridinised 66° o.p.: 500 gal. and up, in tankers, d/d, per gal., 6s 2d; 100-499 gal. in drums, d/d, pet gal., 6s 6¼d-6s 8½d.
Methyl Ethyl Ketone. All d/d. In 5-gal. drums, £183; in 10-gal. drums, £173; in 40/45-gal. drums, under 1 ton, £148; 1-5 tons, £145; 5-10 tons, £144; 10 tons and up, £143; in 400-gal. tank wagons, £140.
Methyl *iso*Butyl Carbinol. All d/d. In 5-gal. drums, £203; in 10-gal. drums, £193; 40-45 gal. drums, less than 1 ton, £168; 1-9 tons, £165; 10 tons and over, £163; in 400-gal. tank wagons, £160.
Methyl *iso*Butyl Ketone. All d/d. In 5-gal. drums, £209; in 10-gal. drums, £199; in 40/45-gal. drums, under 1 ton, £174; 1-5 tons, £171; 5-10 tons, £170; 10 tons and up, £169; in 400-gal. tank wagons, £166.
***iso*Propyl Acetate.** In drums, 10 tons, d/d, £137; 45-gal. drums, d/d, £143.
***iso*Propyl Alcohol.** Small lots: 5-gal. drums, £118; 10-gal. drums, £108; 40/45-gal. drums: less than 1 ton, £83; 1-9 tons, £81; 10-50 tons, £80 10s; 50 tons and up, £80.

RUBBER CHEMICALS

Carbon Disulphide. According to quality, £61-£67.
Carbon Black. UKARB-327-7¼d. per lb. ex-works Swansea, 3 ton lots and over, under 3 tons but not less than 1 ton 7¾lb ex-works, ex-store, London and Manchester, 8¼d per lb.
Carbon Tetrachloride. Ton lots, £83 15s.
India-Rubber Substitutes. White, per lb., 1s 5¾d to 1s 8d; dark, d/d, per lb., 1s 1¼d-1s 5d.
Lithopone. 30%, about £56 10s.
Mineral Black. £7 10s-£10.
Sulphur Chloride. British, about £50.
Vegetable Lamp Black. 2-ton lots, £64 8s.
Vermilion. Pale or deep, 7-lb. lots, per lb., 15s 6d.

COAL TAR PRODUCTS

Benzole. Per gal., min. 200 gal., d/d in bulk, 90's, 5s. 3d; pure, 5s 7d.
Carbolic Acid. Crystals, min. price, d/d bulk, per lb., 1s 4d; 40/50-gal. ret. drums extra, per lb., ¼d. Crude, 60's, per gal., 8s 4d..
MANCHESTER: Crystals, d/d, per lb., 1s 4d-1s 7d; crude, naked, at works, 8s 5d.
Creosote. Home trade, per gal., according to quality, f.o.r. maker's works, 1s-1s 9d. MANCHESTER: Per gal., 1s 2d-1s 8d.
Cresylic Acid. Pale 99/100%, per gal., 6s 6d; 99.5/100%, per gal., 6s 8d. D/d UK in bulk: Pale ADF, per imperial gallon f.o.b. UK, from 7s 8d to 9s 3d; per US gallon, c.i.f. NY, 100 to 118.5 cents freight equalised.
Naphtha. Solvent, 90/160°, per gal., 5s. 1d; heavy, 90/190°, for bulk 1,000-gal. lots, d/d, per gal., 3s 11d. Drums extra; higher prices for smaller lots.
Naphthalene. Crude, 4-ton lots, in buyers' bags, nominal, according to m.p.: £19-£30; hot pressed, bulk, ex-works, £40; refined crystals, d/d min. 4-ton lots, £65-£66.
Pitch. Medium, soft, home trade, f.o.r. suppliers' works, £10 10s; export trade, f.o.b. suppliers' port, about £12.
Pyridine. 90/160, per gal., 15s-17s 6d.
Toluol. Pure, per gal., 5s 2d; 90's, d/d, 2,000 gal. in bulk, per gal., 4s 11d. MANCHESTER: Pure, naked, per gal., 5s 6d.
Xylol. According to grade, in 1,000-gal. lots, d/d London area in bulk, per gal., 5s 11d-6s 2d.

INTERMEDIATES AND DYES

(Prices Nominal)

m-**Cresol** 98/100%. 10 cwt. lots d/d, per lb., 4s 9d.
o-**Cresol** 30/31°C. D/d, per lb., 1s.
p-**Cresol** 34/35°C. 10 cwt. lots d/d, per lb. 5s.
Dichloraniline. Per lb., 4s 6d.
Dinitrobenzene. 88/99°C., per lb., 2s 1d.
Dinitrotoluene. Drums extra. SP 15°C., per lb., 2s 1½d; SP 26°C., per lb., 1s 5d; SP 33°C., per lb., 1s 2½d; SP 66/68°C., per lb., 2s 1d.
p-**Nitraniline.** Per lb., 5s 1d.
Nitrobenzene. Spot, 90 gal. drums (drums extra), 1-ton lots d/d, per lb. 10d.
Nitronaphthalene. Per lb., 2s 5½d.
o-**Toluidine.** 8-10 cwt. drums (drums extra), per lb., 1s 11d.
p-**Toluidine.** In casks, per lb., 6s 1d.
Dimethylaniline. Drums extra, c.p., per lb., 3s 5d.

DIARY DATES

WEDNESDAY 1 APRIL

S.A.C.—London: C.S., Burlington Hse., W.1, 7 p.m. 'Modified hydroxamic acid method for estimating of total esterified fatty acids in plasma', by D. M. Morgan and K. J. Kingsbury; 'Determination of small amounts of alpha picoline in pyridine by a solution temperature method', by K. A. Adey and J. D. Cox; 'Separation of copper, cobalt and nickel', by W. D. Duffield; 'Additive effect of substituent groupings in the chromatographic behaviour of phenoxyacetic acids', by L. S. Bark and R. J. T. Graham.

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.15 p.m. Nutrition panel A.G.M. 'Facts about food supplies', by Prof. H. Nicol.

Soc. of Instrument Technology—Sheffield: Univ., 7 p.m. Section a.g.m. and 'Instrumentation and automatic control at I.C.I., Billingham', by C. H. Gregory.

THURSDAY 2 APRIL

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.15 p.m. Microbiology group A.G.M. Talk by Dr. P. W. Brian.

FRIDAY 3 APRIL

Plastics Inst.—Manchester: Textile Inst., Blackfriars St., 6.45 p.m. 'Developments in processing and application of acrylic resins', by L. Griffiths.

S.C.I.—Manchester: Robinson Lecture Theatre, Univ., 6 p.m. Manchester section a.g.m. 'Titanium and its alloys as materials of construction for chemical plant', by Dr. K. W. J. Bowen.

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TRADE NOTES

Reddish Chemical Co. Moves

The Reddish Chemical Co. Ltd., detergent manufacturers, Globe Works, Reddish, Stockport, are transferring production to a new factory on the trading estate at Cheadle Hulme. The new factory, which is on a four-acre site, has a large multi-bay manufacturing department with specially designed loading bays. New plant and methods will prevent smell or dust escaping.

Stainless Steel Plant

Stainless steel plant for the chemical and allied trades is the subject of a brochure produced by the Longclose Engineering Co. Ltd., Crescent Works, Dewsbury Road, Leeds 11. It deals with pumps, pressure vessels, quick-acting pressure covers, coils, storage, mixing and processing, and jacketed vessels. Also available is a leaflet on stainless steel parallel slide fullway valves.

Incandescent Heat Agreement

For some years, Incandescent Heat Co. Ltd. have manufactured process equipment to the designs of the Swenson Evaporator Co. (a division of the Whiting Corporation) of Harvey, Illinois. An agreement has now been reached by which Incandescent have exclusive selling and manufacturing rights in the U.K. for all Swenson products.

To handle this work, a chemical plant division has been formed, headed by Mr. C. J. V. Denning. In addition to dealing with all enquiries for Swenson evaporators, crystallisers, filters and spray dryers, the division will also handle sales of direct-fired heaters and combustors, air heaters and other specialised high temperature heat exchangers, high temperature furnaces, and other thermal equipment of interest to users of chemical process plant.

F. J. Hone Ltd.

Reference to F. J. Hone Ltd., 19 Eldon Park, London S E.25, in the Master Index to the *1960 Chemical Age Directory and Who's Who*, p. 257, incorrectly appeared under the letter 'N'. The telephone number should have read 'Addiscombe 3117'. Readers are asked to correct their copies accordingly.

Evans Medical Supplies

Evans Medical Supplies Ltd. announce that the following companies in the group are now operating under new names: Evans Medical (Northern) Ltd., Newcastle upon Tyne (formerly Evans Medical Supplies (Northern) Ltd.); Evans Medical (India) Pty. Ltd., Bombay, Calcutta and Madras (formerly Evans Medical Supplies (India) Pty. Ltd); Evans Soc. Anon, Paris (formerly Laboratoires Evans Soc. Anon.); Evans Medical (Ireland) Ltd., Dublin (formerly Evans Medical Supplies (Ireland) Ltd.).

Changes of Address

Kingsley and Keith Ltd. have moved their offices to Rex House, 38 King Willingham Street, London E.C.4. (Mincing Lane 1101/6.) Cable address is Kimpex Cent; Telex No. is London 28386.

The office of Mr. J. L. Thomas, Scottish area manager of the Cape Asbestos Co. Ltd. and his staff has been moved to Hobden Street, Petershill Road, Glasgow N. (Springburn 6144). This is also the new address of Mr. A. A. Clark, Scottish area representative of Cape Building Products Ltd.

Quickfit Assemblages on Show

Quickfit and Quartz Ltd., Stone, Staffs, are giving a special exhibition of laboratory apparatus for research and teaching purposes at the Royal Institute of Chemistry meeting at the College of Technology, Ashley Down Road, Bristol, from 1 to 3 April. They will display assemblages ranging from semi-micro to macro-scale units designed to show the case with which completed units may be gradually built up from basic sets.

Change of Name

G. S. Chemicals Ltd., Imperial Dye Works, Cairns Road, London S.W.11, have changed their name to G. S. Trading Co. Ltd.

Market Reports

Little Change in Trading Conditions

LONDON There has been no particular feature in the chemical markets during the past week. Buying activity for home consuming industries has been on a reasonable scale and a steady flow of overseas enquiry has been encountered. Seasonal demand for fertilisers is now making itself felt and some pressure for deliveries has been experienced.

With the exception of the non-ferrous metal compounds prices show little change Sulphate of copper is currently quoted at £79 per ton less 2% f.o.b. Liverpool, an increase of £1 per ton. Conditions and prices remain steady in the coal-tar products market.

MANCHESTER Demand for heavy chemicals on the Manchester market during the past week has been fairly steady, mainly against contracts, and some further improvement is looked for after the Easter lull. Export business has been maintained. Prices are fairly steady throughout the range with a further rise of £1 a ton reported for sulphate of copper. The improved demand for fertilisers continues.

GLASGOW With perhaps still a rather subdued position in some directions, the past week has shown little change in conditions generally on the Scottish market. Demands have been reasonably steady and although varied have mostly featured the usual range of heavy chemicals. Prices have remained firm with little change.

Conditions have improved in regard to agricultural chemicals with considerably more interest being shown in seasonal demands.

Science Debaters Heavily Defeated by Classicists

A HEAVY defeat was the fate of the motion "that the education of our future rulers should be in the sciences rather than the humanities" when put to the vote in the London University Senate House on 17 March. The occasion was

Sir Alexander Fleck, who proposed the motion, and Professor Sir Cyril Hinshelwood, who presided

a joint debate between the Royal Institute of Chemistry, the Classical Society and the Haldane Society.

Professor Sir Cyril Hinshelwood, president of both the Royal Society and the Classical Association, was in the chair. The motion was proposed by Sir Alexander Fleck, I.C.I. chairman, who quoted Lord Cherwell as saying "It is more important to know the properties of chlorine than the improprieties of Claudius." His seconder, Professor A. R. Ubbelohde, Professor of Thermodynamics, London University, was ill and his speech was read for him. In it he said that our future rulers should not be denied some familiarity with scientific ways of understanding external nature.

Opposing the motion were Professor B. Farrington and Professor W. Beare. Farrington said the idea of studying the structure of the atom and not the language that made that study possible was a barbarity.

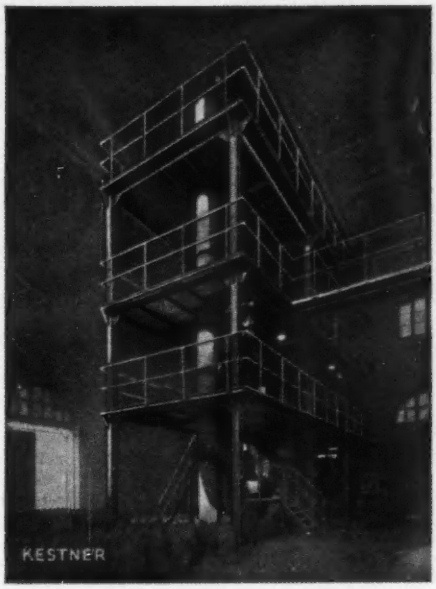
People in the News

(*Continued from page* 546)

March, 1959. He will be visiting agents, representatives and customers in the Persian Gulf, Iraq, Iran and the Lebanon.

● MR. R. J. FACER has been appointed general sales manager of British Geon Ltd., Devonshire House, Piccadilly, London W.1. MR. J. E. RICHARDSON takes over as export manager from MR. S. A. WILLIAMS, who becomes administration manager (sales). MR. G. Y. BLOMELEY has been appointed northern manager.

● MR. R. G. SOOTHILL, previously deputy chairman of Turner and Newall Ltd. has been appointed chairman of the company in succession to the late SIR WALKER SHEPHERD. The new deputy chairman is MR. R. M. BATEMAN, who has been with the company for more than 25 years and who is chairman of Turner Asbestos Cement Co.



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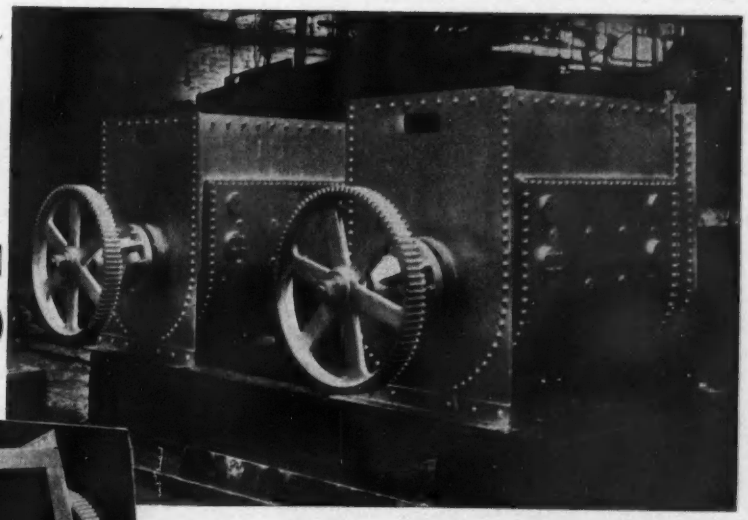

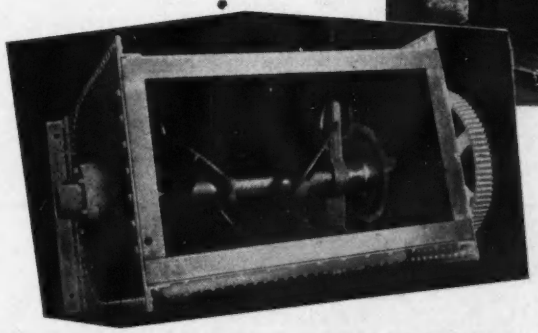

These hot water jacketed Mixing Vessels (capacity ½ Ton each) are for use in chocolate manufacture. The lower photograph shows the stirring gear. We manufacture Mixers, Blenders and Process Vessels for a wide range of Industries and applications.

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NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 6 May

Brightening of aromatic fibre and film forming polyesters. Imperial Chemical Industries Ltd. **813 093**

Vessels for mixing, agitating or similar purposes. William Bolton Ltd. **812 987**

Process for shaping pyrophoric cerium-iron alloys by extrusion pressing. Treibacher Chemische Werke A.G. **813 063**

Heat-exchangers for fluent materials. Holo-Flite International Inc. **812 986**

Fused salt baths. Imperial Chemical Industries Ltd. **813 134**

Shell moulding compositions based on sand and a phenolaldehyde binder. Hercules Powder Co. **812 905 & 812 906**

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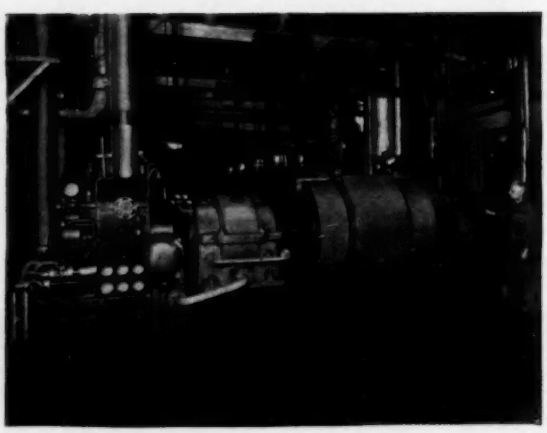

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